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JOURNAL OF EDUCATIONAL RESEARCH

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JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXXI MAY, 1938 Number 9

THE INTERPRETATION OF SCORES IN TESTS AND EXAMINATIONS

S. A. COURTIS
University of Michigan

THE use of some form of test or examination has been a distinctive feature of educational programs from primitive times to the present. The need for appraisal of teaching effort is a universal need. Among animals and primitive civilizations this need for a test is satisfied by competitive contests of strength and skill, and wherever primitive conditions prevail, such contests are still the accepted form of test. For instance, in prize fighting the actual fight is the measure of the success of the training to which the contestants have been subjected, and in the war game now in progress throughout the world, behind the bluff and counterbluff of diplomacy, looms the day of conflict in which achievement in actual battle will be the criterion by which the victor will be determined.

It is not strange, therefore, that *achievement* in tests and examinations has come to be the critical factor in interpretation.

The written examination as we know it in academic circles dates from about 1700 and was itself but a new form of the older oral examination which had been in use for many centuries. These examinations, however, represent a curious modification of the achievement concept. On the one hand a written examination is judged in terms of achievement, as was the primitive form of trial by contest. On the other hand, it is not actually that contest that is used to secure a basis for predicting whether or not the individual is likely to succeed. Probably most persons would agree that achievement in a test of reading, for instance, is not a valid measure of what one desires to measure *unless* achievement in the reading test is prognostic of the success of the individual in using reading in life situations. Yet this criterion of validity is seldom applied. Instead we tend to shift the emphasis to determining whether or not the individual is adequately *prepared to face* the actual life test, never questioning whether or not what the tests measure is really the contributing factor to success in the life situation. We carry over the primitive respect for achievement

to the new situation in spite of the subtle shift of emphasis and *assume* that if the individual can achieve in the test, he will achieve correspondingly in life. Our educational tests are thus more like the physical examinations given by doctors to our would-be champions *before* they enter the ring to make sure they are physically fit for the fight.

It is important to our thinking that we separate these two functions of appraisal and prediction, and measure separately the degree to which a given examination achieves each purpose. For it is conceivable that an examination might be an excellent instrument of appraisal of what was taught in a given course, and yet the achievement measured might be a worthless basis of prediction. The opposite is also possible. For present purposes, however, it is enough to realize that the conventional examination is at least *one step away* from the competitive contests of life by which all great issues are decided.

As civilization has become more complex, man has taken other steps along the pathway of abstraction and modification of basic ideas until today we have become very sophisticated indeed. For instance, all of us *to some degree* recognize that raw achievement in a test or examination needs much interpretation before its significance can be ascertained. Intelligence, we believe, is a factor influencing scores. The development of the achievement quotient is at least an attempt to allow for differences in intelligence.

Are there other factors which similarly affect achievement and make it difficult to tell what a score means? The answer is yes; there are many factors, *very* many. While most researchers would agree that achievement scores are affected by many factors, the influence of the primitive respect for achievement leads many persons to keep right on interpreting raw scores *as if* they were satisfactory predictive measures of life achievement. That is, in all our schools our teachers mark children and themselves in terms of raw achievements in tests and in examinations without stopping to question the validity of their actions. Once the doorway of doubt is opened, however, the problem becomes an appropriate field for research, and if sufficiently vigorous doubts can be generated by the evidence from research, the time may come when better tests and better methods of instruction may be evolved. The purpose of this paper is to *generate doubts* about the conventional attitudes toward achievement scores in written examinations and tests of all types and kinds.

The subjects to whom the tests and examinations to be discussed were given were twenty-one graduate students who took a course called "Edu-

cational Tests and Measurements'' at the University of Michigan this last semester. The data presented below are from tests given during the semester and at the time of the final examination.

Let's begin with one of the final examinations. It consisted of fifty multiple-choice questions designed to reveal the degree to which the students were able to discriminate among four definitions of certain key concepts and terms discussed during the semester as shown in the illustration.

ILLUSTRATION

Instructions: Write the letter of the *best* answer in the parenthesis at the end of the question.

Item 11. Multiple-choice test ..... ( )

W. A test which provides for choice of the questions to be answered

X. A test calling for the selection of the correct answer from among three or more given answers

Y. A test in which each element has more than one possible answer

Z. A test in which in each answer, responses to two or more questions must be combined

The response considered by the instructor to be the ''best'' answer was ''X.'' Seventeen of the class selected ''X,'' and four ''Y.'' No one chose ''W'' or ''Z.''

The achievement of the members of the class in the examination, in terms of the number of questions answered correctly in twenty minutes, ranged from 9 to 27. The midscore was 18 and the mid-deviation was ± 4. (Figure I)

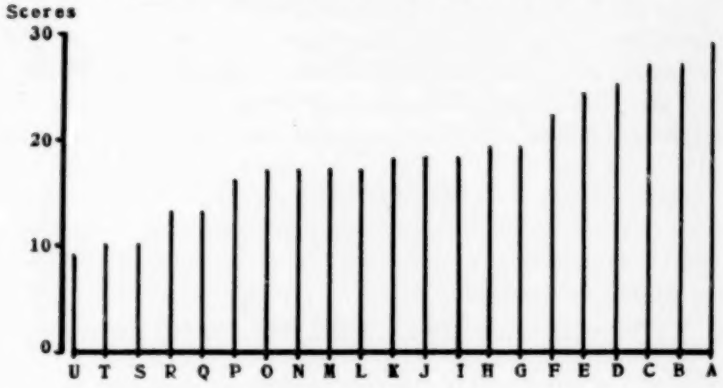
In attempting to rank order the scores of the class it was found that certain individuals had the same achievements. For instance, individuals L, M, N, and O each had an achievement of 17 answers right, but L had tried 31 questions, M, 32 each, N, 37, and O, 44. Clearly L's achievement of 17 is better than O's. Perhaps we ought to allow for the well established fact that some individuals by nature work more rapidly than others.

The achievement scores in terms of number of questions attempted in twenty minutes present a picture quite different from that in Figure I. (Figure II)

The midscore of the class rises to 40, and although the mid-deviation is still ± 4, the total range of individual difference is not so great (1.5). Perhaps the instructor's questions are poorly phrased and his key answers

FIGURE I

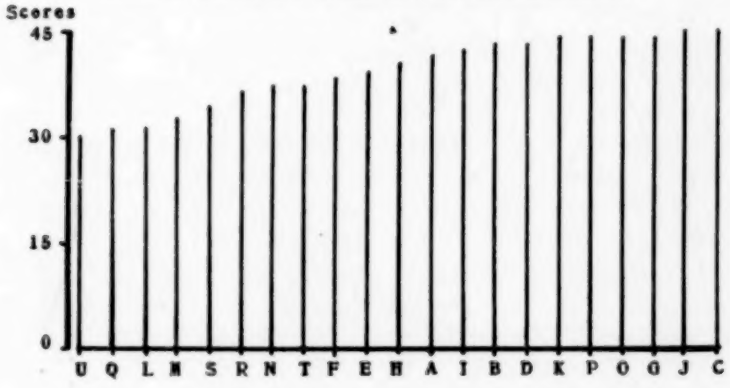
SCORES IN TERMS OF NUMBER OF ANSWERS CORRECT



Letters represent individuals. Scores range from 29 to 9. The largest score is 3.2 times the smallest.

FIGURE II

SCORES IN TERMS OF NUMBER OF QUESTIONS ATTEMPTED



The letters represent the same individuals as in Figure I. The irregular order indicates the degree of shift caused by the change in the method of scoring.

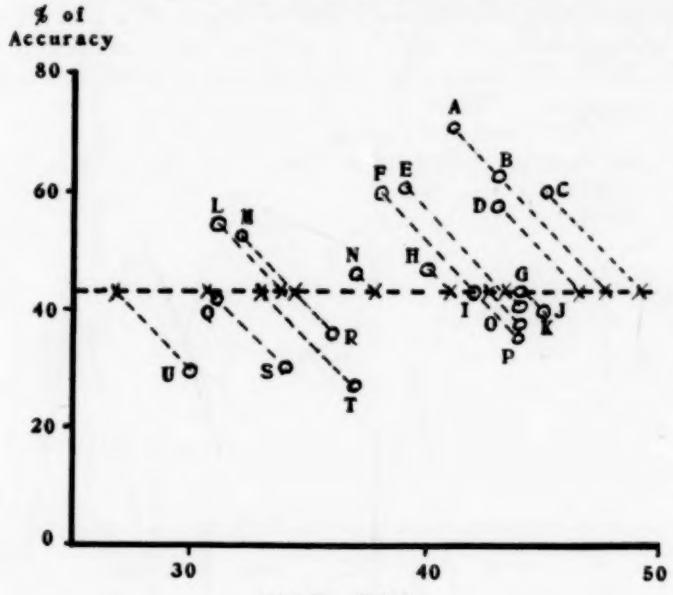
wrong. The instructor's key scored in terms of the *answers most frequently given by the class* yielded an achievement score for the instructor of 26 right out of 47 attempted, or 55 percent accuracy, while the class score in terms of the instructor's key was 18 right out of 40 attempted or 45 percent. That the instructor might be wrong, however, is unthink-

able in academic circles, so this lead will not be pursued farther.

Instead it seems reasonable to try to "correct" the scores in number right for accuracy of work. In handwriting and arithmetic we have experimental evidence that as a person increases his speed, he decreases his accuracy, other things being equal, and this generalization agrees with general experience.[1] Let us, therefore, determine the rate scores at the average accuracy level. We shall have to *assume* a certain speed-accuracy

FIGURE III

TRIED SCORES ADJUSTED TO STANDARD ACCURACY



Standard accuracy taken as average accuracy, 43%. Speed-accuracy relationship assumed to be that an increase in speed of one example results in a decrease in accuracy of 4%. Circles represent actual scores, X's represent adjusted scores.

The rank order of the adjusted scores is:

U S Q T R L M N H P K F O I E J G D B A C

[1] Gates, A. I. "The Relation of Quality and Speed of Performance," *Journal of Educational Psychology*, March, 1924.

Courtis, S. A., and Thorndike, E. L. "Correction Formulae for Addition Tests," *Teachers College Record*, January, 1923.

Courtis, S. A. *Why Children Succeed.* (Detroit: Freisema Brothers Printing Co., 1925), pp. 106-160.

relationship but the exact relationship is unimportant at present. The median individual accuracy, 43 percent, was chosen as standard. The adjusted scores were computed by the formula

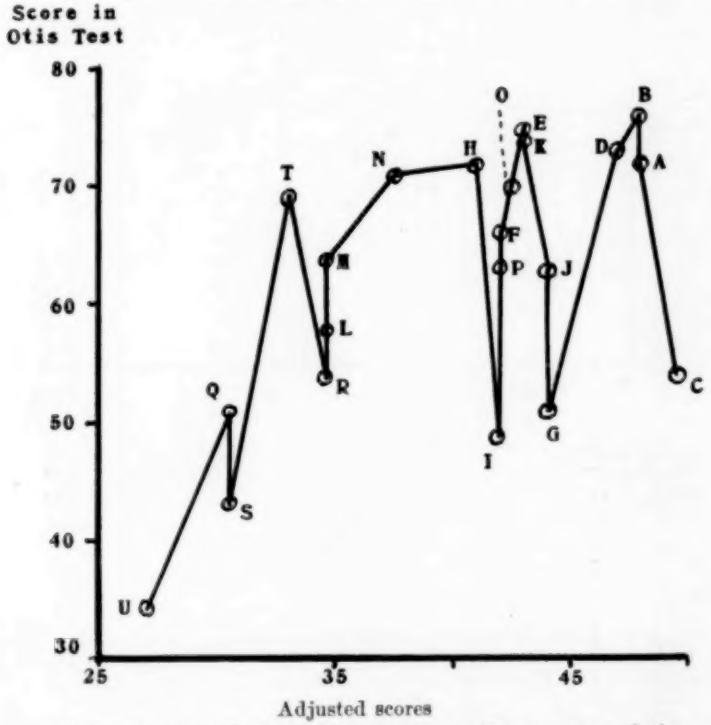
$$\text{Adjusted score} = \text{Number Tried} + \left(\frac{\text{Accuracy} - 43\%}{4\%}\right)$$

That is, it was assumed that an increase in speed of one example would lower the percentage of accuracy 4 percent. This correction applies only to speed-accuracy adjustments. Probably some of the changes were caused by changes in effort, but at present no method of measuring changes in effort is known. (Figure III)

The slanting lines indicate the relationship assumed. Individuals on the same slanting lines are considered equal in ability and the individuals were rank ordered in terms of their achievements at the common accuracy level, 43 percent.

FIGURE IV

RELATION OF ADJUSTED SCORES TO SCORES IN MENTAL TEST



Between scores of 25 and 40 there appears to be some correlation between score and intelligence but there are many exceptions.

The change in the position of individuals from their first raw achievement order ranges from − 6 places to + 5 places. Only five out of the 21 students have the same rank as at first. A third of the class would be moved up or down from three to six places. The best are still best and the worst, worst, but the fact remains that by simply changing the basis of scoring, the interpretation given a student's performance changes greatly. The test probably places an individual with an uncertainty of about a third of the total range.

But there are other factors for which correction ought to be made. What about intelligence? The class was given the Otis quick scoring test of mental ability and the raw scores in this test compared with the adjusted achievements in the examination. (Figure IV)

On the lower ranges of achievement there appears to be some relationship between the two tests but not on the upper. At all levels marked exceptions occur. Do these mean that the Otis test might also be scored in a variety of ways and that some other method of scoring might yield a better correlation? Or are there other factors to be considered, such as differences in the past experiences and in knowledge of the subject which students had at the beginning of the course.

At the very outset of the course, the instructor gave an inventory test of 307 items taken from the glossaries in various texts on educational measurements. It was a subjective test. The students were merely asked to estimate their degree of familiarity with the various terms.

INVENTORY TEST — TERMS — SUBJECTIVE APPRAISAL

Name..... Date..... Score.....

Explanation:

This test covers a number of terms used in educational measurement and statistics. For each term you are asked to indicate by writing the number of the item in the proper column whether *you consider:*

1. That *you* have mastered the term so that you use it freely without reflection when the need arises. (M), or
2. That *you* know the term well enough to define it correctly when called on to do so, or to use it (after reflection) when the need arises. (K), or
3. That *you* understand the term and comprehend its meaning well enough to use it correctly *in conversation*, but not in the solution of a problem without further study. (U), or
4. That *you* have heard the term but have only a very hazy idea of what it means. (H), or
5. That *you* have never met the term and do not know what it means. (D)

Your actual control over the term will be measured by another test, and by your use of these terms in class work, but in this test it is *your opinion* of your control that is wanted.

For terms you do not know, make your class work and your study of the text count towards mastery.

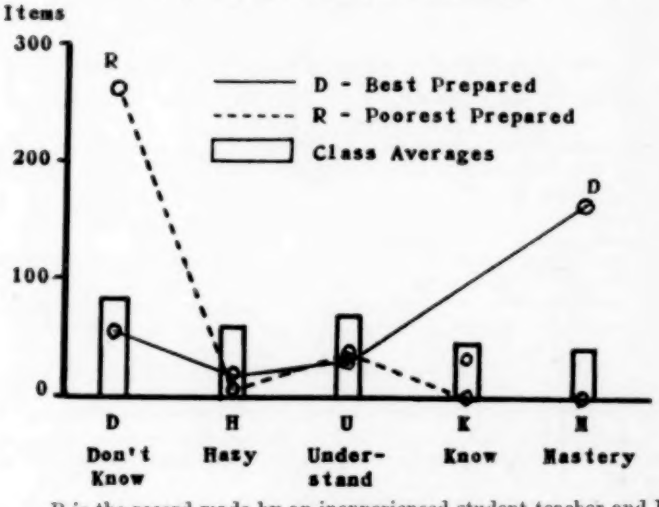
Questions Key: D, Don't Know; H, Heard; U, Understand; K, Know; M, Mastered No. Terms	Check in proper column Response D	H	U	K	M
1. Ability . . .					
2. Abscissas . . .					
3. Acceleration . . .					
4. Accomplishment quotient . . .					
5. Accomplishment ratio . . .					

On the average the class judged that it had mastered 41 of the 307 items, that it knew well enough to use with the aid of a text 48 items more, that in addition it "understood" 69 items, that it had heard about 59 others, and found 91 in the list which were absolutely foreign to its experiences.

The best prepared individual, "D," considered that he had mastered 167 items before entering the class, knew 32 more, understood 32 others, had a hazy idea of 20 more, and found 56 which were new to him. At the other extreme, individual "R" had mastered and knew *no* items, understood but 35, had a hazy idea of seven more and owned to 263 items to be learned. Should equal final achievement be expected from such diversity

FIGURE V

DIFFERENCES IN INITIAL PREPARATION



R is the record made by an inexperienced student teacher and D that made by a student experienced in using tests.

of previous preparation in students? "D" had been actively using tests professionally for some years, while "R" was an inexperienced student teacher. (Figure V)

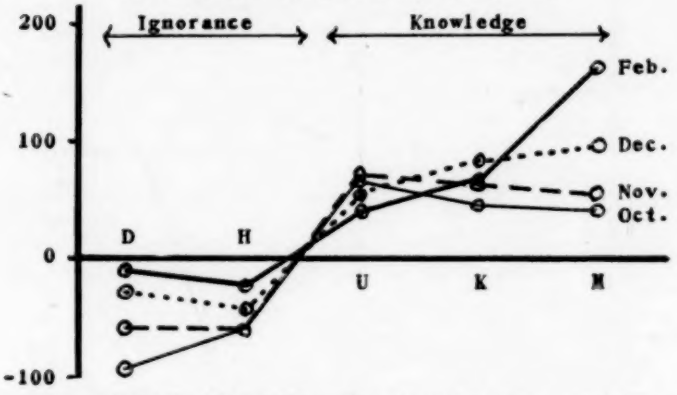
The test was repeated after every six weeks of work; it was given four times in all (Figure VI). The class scores at successive testings were:

SCORES IN INVENTORY TEST

Key Symbols	D	H	U	K	M
October	90	59	69	48	41
November	57	59	71	63	54
December	26	43	58	81	96
February	10	21	42	67	163

FIGURE VI

CLASS SCORES IN INVENTORY TEST
RESULT OF MEASUREMENT EVERY SIX WEEKS



Items labeled "Don't Know" and "Hazy" are counted as Ignorance and plotted as negative values.

The individual growth records of students "R" and "D" were:

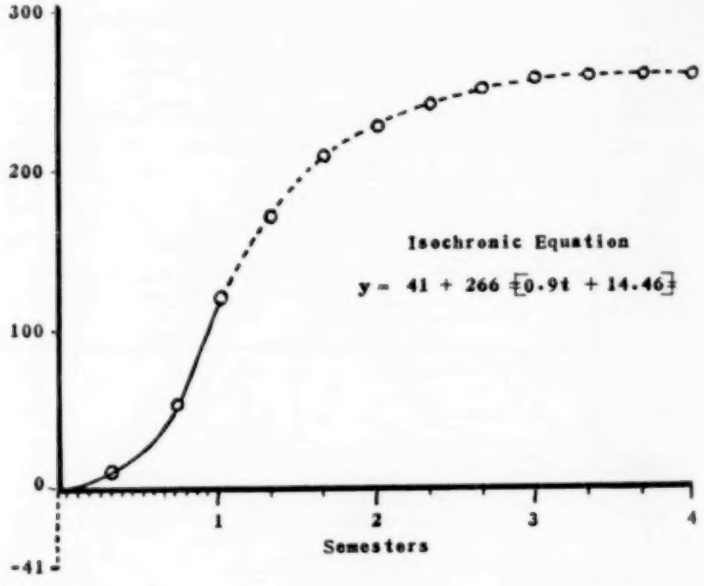
Individual		Don't Know	Hazy	Understand	Know	Mastery
R	October	263	7	35	0	0
	November	131	67	108	1	0
	December	37	78	170	31	1
	February	1	104	156	44	2
	Adjusted score in final test, 34 Intelligence score, 54					
D	October	56	20	32	32	167
	November	27	21	22	20	217
	December	12	26	24	35	210
	February	2	20	20	12	252
	Adjusted score in final test, 47 Intelligence score, 73					

Probably R has made the greater growth although his achievement in the final examination is less than D's.

Note that, at the outset "D" was better prepared in his own estimation than the class was at the end of the course. "D" also made a higher score in the Otis test. Should not such differences be allowed for in evaluating achievement? Most of us would answer yes, but immediately ask another question, "How?" That of course is another story.

The giving of the *same test* repeatedly makes it possible to study the *growth in mastery* of the class as a whole. (Figure VII)

FIGURE VII
TIME REQUIRED FOR MASTERY



The isochronic[2] equation for the curve of growth using the initial mastery of 41 as a zero point makes it clear that four semesters of such instruction would be necessary to bring the class as a whole to complete mastery of the content covered; that is, *if raw achievement scores are to be taken at their face value.*

Consideration of such facts makes one long for a method of interpretation that would yield a simple unambiguous score of the amount learned. Differential tests offer a possible solution.

[2] "Maturation Units for the Measurement of Growth," *School and Society*, XXX, No. 777 (Nov. 16, 1929), 683 pp.

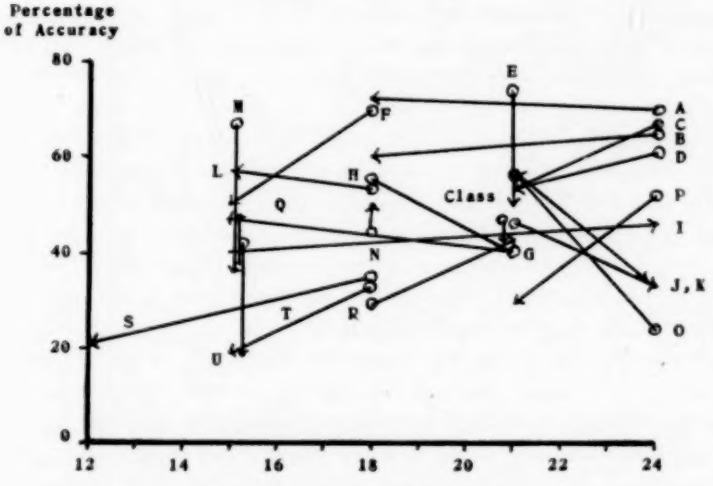
For instance, the examination referred to above was actually given as two tests of 25 items each. The two tests were *identical* except that for the first test the 25 items were selected which were best known at the outset, while the second test was composed of 25 items which were least well known at the outset. That is, one test was easy and the other hard. Each test was scored for both rate and accuracy.

The class scores in rate were on both tests 21 questions attempted in the time allowed, but the accuracy fell from 46 percent on the easy test to 42 percent on the hard test. In terms of the theory of differential testing, since intelligence, speed, previous experience, etc., affect score in *both* tests alike, the relation between the two scores is a measure of ability. That is, if an individual's score, *whatever its achievement level*, falls little from the easy to the hard test, it means that he is able, while if it drops greatly, it means he has not profited by his study.

Note that the class accuracy was not high on the easy test, composed of items the class had mastered before they came to the course. Why? The students' answers were that from 9:00 o'clock to 11:00 that same

FIGURE VIII

DIFFERENTIAL TESTING



O represents rate-accuracy scores on the easy test, ⟶ the scores on the hard test. Each arrow represents one individual. The arrow representing the class score as a whole is marked Class. The arrows show many different types of variation in response.

morning they had been working on a two-hour examination in another course and were so fatigued that they could scarcely think at all from 11:00 o'clock to 1:00. Also some students had driven more than 50 miles, getting up before 5:00 o'clock in order to arrive at Ann Arbor on time for the nine o'clock class. In theory, differential testing would remove this handicap of fatigue as it would affect the score in both tests equally. Fatigue would satisfactorily account for the low achievement scores, however.

Actually, individuals responded very differently to the differential tests. In some the fatigue steadily increased as the examination proceeded. In others the stimulus of a new type of test led to *better scores* on the second and more difficult test. No consistent type of response was found. (Figure VIII)

In other words raw achievement scores measure achievement and achievement alone. What is achieved today is no measure of what will be achieved tomorrow. Each new test and each new situation will yield a new achievement score, and the results in any test will yield as many different scores as there are methods of scoring.

Educational tests and measurement have been my special fields of research since 1907. After thirty years of study my conclusion is that no single test and no battery of tests of any type or description yields unambiguous information about the quantities educationalists wish to measure. Tests are very fine instruments of research. They enable us to describe precisely and unambiguously the response the subject makes to the test conditions. They stimulate thought and give rise to further problems in research. But from the point of view of scientific measurement of ability and as practical bases for evaluation and experimentation they are no more adequate than were the measuring instruments of the alchemists and the astrologers. That is why the conclusions of different experimenters vary so widely. We do not yet know how to measure in the scientific sense a single human quantity.

The interpretation of our present test scores is a matter of scientific deduction (intelligent guess work) and very difficult. Before even a beginning of success in interpretation is achieved, two further advances will need to be made. First, a measure of effort must be invented so we can tell how hard each individual is trying. Second, we shall need to measure and remeasure the individual many, many times and judge of his progress in terms of *his own growth curve* not in terms of age or grade norms. Marks have no consistent meaning when applied to individual achievement scores. Each personality is unique, his scores have a

unique interpretation. Fortunately, although we do not yet know how to achieve our goal, we have an adequate criterion of success. We can justly claim to have the beginnings of a science of education only when the achievements of an individual in different tests and under different conditions can be so interpreted that all measurements yield the same picture of ability. An individual's ability does not change from test to test within a short period of time any more than the atomic weight of oxygen changes from compound to compound. Let's not deceive ourselves and others into believing we have made much progress in really measuring what we want to measure. So far, our achievements are limited to describing with a fair degree of unambiguity what the individual does in a test, not what that achievement signifies.

THE PREDICTIVE VALUE OF GENERAL SCIENCE

ROYAL B. EMBREE, JR.
University of Minnesota
and
OLIVER R. FLOYD
University of Wisconsin

IN an investigation of the value of general science as preparation for the study of advanced sciences, one of the writers found little evidence that the ninth grade science course contributed to superior achievement in Biology, Chemistry or Physics. (2) This served to raise the question which is the concern of the present article. May achievement in general science be used to predict the probable success or failure of an individual pupil in other science courses in the school?

This problem is a significant one, especially in view of the stress which has been placed upon the guidance function of the various subjects in the junior high school curriculum. Predictive value was claimed for general language, to cite one instance, but this contention had to be abandoned or at least greatly modified in the light of studies by Kaulfers. (3, 4) Similarly, the usefulness of general science in forecasting the probable success of pupils in later science courses has been advanced as a justification for the inclusion of the subject in the school program. Many principals, teachers, counselors and others associated with guidance have based their advice, in large measure, upon the mark earned in general science when assisting pupils to decide how much science to include upon their senior high school programs. Does this practice rest upon any defensible basis?

In order to throw some light upon this question, recourse was had to the records of pupils in science courses in the University High School for the years 1926-1933. The offering in science at this school during the period under consideration consisted of general science in the ninth grade, Biology in the tenth grade, and Chemistry and Physics open to eleventh and twelfth grade pupils.

The honor point ratio was used as the measure of achievement in all courses. In obtaining this ratio, honor points were assigned to quarter marks according to the following scale: A = 3, B = 2, C = 1, D = 0, E = −1. The honor point ratio consists of the total number of honor points divided by the total number of quarter credits.

All of the pupils involved in this study had been tested with a series of five group intelligence tests. The tests used were Army Alpha 8,

Haggerty Delta II, Miller Mental Ability Test, Form A, Terman Group Intelligence Test, Form A, and Pressey Senior Classification Test. I.Q's. from each test other than the Terman were equated with the Terman according to the method described by Miller. (5) The median I.Q. of each pupil, based upon the five equated values, was used as the measure of intelligence.

Zero order and multiple coefficients of correlation representing the various relationships among advanced science honor point ratio, general science honor point ratio, and I.Q, were calculated. The partial coefficients of correlation, with I.Q. held constant, were also obtained. Similar measures were determined indicating the relationships existing between advanced science honor point ratios and the honor point ratio representing the general average of the pupil in all courses pursued in the ninth grade.

The inter-relationships existing among advanced science honor point ratio, general science honor point ratio, and I.Q. are shown in Table I. The correlation between honor point ratios for advanced science and general science is highest for Biology and lowest for Chemistry. In all cases, the relationship between I.Q. and honor point ratio in advanced science is less marked than that between the honor point ratios in advanced and general science.

Table II includes the inter-relationships existing among advanced science honor point ratio, total ninth grade honor point ratio, and I.Q. In this case, the correlation between honor point ratio for advanced science and total ninth grade are highest for Biology and lowest for Physics. Again, the relationship between I.Q. and advanced science honor point ratio is less marked than between honor point ratios for advanced science and ninth grade.

TABLE I

COEFFICIENTS OF CORRELATION AMONG ADVANCED SCIENCE HONOR POINT RATIO, GENERAL SCIENCE HONOR POINT RATIO, AND I.Q.

	N	Gen. Sc. (x)	I.Q. (x_1)	$R_{y.xx_1}$	$r_{yx.x_1}$
Biology (x) General Science (y)	207	.693 ± .036	.498 ± .052 .469 ± .054	.720 ± .033	.600 ± .044
Chemistry (y) General Science (x)	133	.556 ± .059	.414 ± .072 .401 ± .073	.602 ± .055	.480 ± .067
Physics (y) General Science (x)	103	.655 ± .073	.511 ± .073 .530 ± .071	.683 ± .053	.527 ± .071

That the two groups, one selected upon the basis of general science and the other for which ninth grade honor point ratio is the predictive

measure, are closely comparable for all three advanced sciences is indicated in Table III. Comparisons are made upon the basis of I.Q. and honor point ratio in advanced science.

TABLE II

COEFFICIENTS OF CORRELATION AMONG ADVANCED SCIENCE HONOR POINT RATIO, 9TH GRADE HONOR POINT RATIO, AND I.Q.

	N	9th G HPR(x)	I.Q.(x_1)	$R_{y.xx_1}$	$r_{yx.x_1}$
Biology (y)	332	.699 ± .028	.505 ± .041	.716 ± .027	.588 ± .036
9th G HPR (x)			.536 ± .039		
Chemistry (y)	210	.665 ± .039	.516 ± .051	.693 ± .036	.541 ± .049
9th G HPR (x)			.524 ± .050		
Physics (y)	144	.589 ± .054	.504 ± .062	.610 ± .052	.397 ± .070
9th G HPR			.653 ± .048		

The coefficient of correlation given in Tables I and II are compared in Table IV. Two groups are represented for each advanced science, one being the group for which honor point ratios in advanced science and general science are correlated, the other in which correlations were determined between honor point ratios in advanced science and total ninth grade work. Comparison of differences was made through the Z transformation described by R. A. Fisher. The P values, representing the probabilities that differences result from chance, do not approach even marginal significance in any of the nine comparisons made. It may then be concluded that the relationship between honor point ratios for advanced sciences and general science are no more marked than those existing between honor point ratios for advanced sciences and for total ninth grade work. This applies to all multiple and partial, as well as zero order correlations.

TABLE III

COMPARISON OF GROUPS USING GENERAL SCIENCE AS A PREDICTIVE MEASURE AND GROUPS USING 9TH GRADE HONOR POINT RATIO AS A PREDICTIVE MEASURE

	*Group	N	Adv. Sc. Means	H.P.R. S.D.	I.Q. Mean	I.Q. S.D.
Biology:	I	207	1.35	0.82	117.46	11.87
	II	332	1.33	0.83	117.78	11.41
Chemistry:	I	131	1.31	0.82	122.45	11.70
	II	210	1.39	0.89	118.98	12.06
Physics:	I	103	1.31	0.72	116.61	12.03
	II	144	1.48	0.82	119.23	12.71

* I = General Science Used as Predictive Measure.
* II = 9th Grade Honor Point Ratio Used as Predictive Measure.

In Table V, the predictive values of general science honor point ratio and ninth grade honor point ratio may be compared. Standard Errors of Estimate were prepared for zero order correlations and for multiple

TABLE IV

COMPARISON OF GROUPS I AND II WITH RESPECT TO COEFFICIENTS OF CORRELATION AMONG HONOR POINT RATIO IN ADVANCED SCIENCE (y), HONOR POINT RATIO IN GENERAL SCIENCE (x) OR 9TH GRADE (x), AND I.Q. (x_1)

	**Group II	Z_{II}	*Group I	Z_I	Diff $Z_{II}-Z_I$	S D Diff $Z_{II}-Z_I$	P
Biology:	(N = 332)		(N = 207)				
r_{yx}	.699	.87	.693	.85 + .02		.09	.83
$R_{y.xx_1}$	.716	.90	.720	.91 — .01		.09	.91
$r_{yx.x_1}$	.588	.67	.600	.69 — .02		.09	.83
Chemistry:	(N = 210)		(N = 133)				
r_{yx}	.665	.80	.566	.64 + .16		.11	.15
$R_{y.xx_1}$	.693	.85	.602	.70 + .15		.11	.17
$r_{yx.x_1}$	.541	.61	.480	.52 + .09		.11	.41
Physics:	(N = 144)		(N = 103)				
r_{yx}	.589	.68	.665	.78 — .10		.13	.44
$R_{y.xx_1}$	.610	.71	.683	.83 — .12		.13	.36
$r_{yx.x_1}$	.397	.42	.527	.59 — .17		.13	.19

* Group I = General Science H.P.R. Used as Predictive Measure.
** Group II = 9th Grade H.P.R. Used as Predictive Measure.

TABLE V

COMPARISON OF GROUPS I AND II ON THE BASIS OF STANDARD ERRORS OF ESTIMATE ON ADVANCED SCIENCE HONOR POINT RATIO

	*Group	r_{yx} S D est	$R_{y.xx_1}$ S D est
Biology:	I	.693 ± 0.594	.720 ± 0.572
	II	.699 ± 0.593	.716 ± 0.579
Chemistry:	I	.566 ± 0.676	.602 ± 0.655
	II	.665 ± 0.663	.693 ± 0.640
Physics:	I	.655 ± 0.541	.683 ± 0.522
	II	.589 ± 0.659	.610 ± 0.646

* I = General Science H.P.R. as Predictive Measure.
* II = 9th Grade H.P.R. as Predictive Measure.

correlations including an I.Q. variable. Differences are very slight for Biology and Chemistry and somewhat more extensive for Physics, but the most striking factor lies in the fact that none of the measures possesses sufficient significance to be useful for reasonably accurate prediction, especially in individual cases.

The correlation coefficients included in Table VI were computed to make possible a comparison of the predictive value of general science with that of certain other subjects commonly included in the ninth grade programs of most pupils. The differences between coefficients of correlation for general science and English and for general science and mathematics were tested by the method referred to above. Of six such differences, two were marginally significant and four were wholly assignable to chance. Definitely better results, then, will not be obtained in predicting achieve-

ment in advanced sciences by employing marks in general science as opposed to marks in mathematics or English.

In summary, it may be stated that according to the evidence gathered in this investigation, general science, at least as presented in the University High School, cannot be justified upon its predictive value. The following specific conclusions seem warranted:

(1) Achievement in general science is not significantly superior as a predictive instrument to a measure of total achievement in all ninth grade subjects.

(2) General science has no significantly greater predictive value than has ninth grade English or mathematics, excepting marginal superiority to mathematics in relation to marks in Biology and to English where Physics is concerned.

(3) None of these factors, even when supported by intelligence quotient, are sufficiently accurate for prediction in individual cases.

TABLE VI

COEFFICIENTS OF CORRELATION BETWEEN HONOR POINT RATIOS FOR ADVANCED SCIENCE COURSES AND GENERAL SCIENCE HONOR POINT RATIO, 9TH GRADE ENGLISH HONOR POINT RATIO, 9TH GRADE MATHEMATICS HONOR POINT AND I.Q. RESPECTIVELY

	N	Gen. Sc.	9th G. Eng.	9th G. Math.	I.Q.
Biology	207	.693 ± .036	.631 ± .042	.574 ± .047	.498 ± .052
Chemistry	131	.566 ± .059	.524 ± .063	.542 ± .062	.414 ± .072
Physics	103	.655 ± .056	.446 ± .079	.576 ± .066	.511 ± .073

These conclusions, when considered in connection with previous studies which have yielded no clear evidence of the value of general science as preparation for advanced sciences, leave with little support two claims which are frequently advanced for the subject. However, it should be noted that general science may make important contributions to the curriculum of the secondary school in other ways. In fact, it is possible that efforts to develop the propaedeutic or predictive values might inhibit the achievement of other important outcomes.

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4. Kaulfers, Walter. "The Prognostic Value of General Language," *School and Society*, XXVIII (November 24, 1928), p. 664.
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TWO KINDS OF LEARNING IN ARITHMETIC[1]

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LEARNING BY "REPETITION"

Two kinds of learning can be identified in arithmetic. The one kind results in greater proficiency; the required responses come more easily, more quickly, and perhaps more accurately. Illustrations are: increased speed in counting objects, more rapid recall of the number facts in their verbal statements, and greater skill in computing with whole numbers, fractions, and decimals. The teaching procedure is essentially that of providing practice in which the new items occur in relatively unvaried forms and relationships. The changes produced in this kind of learning consist chiefly in the elimination of irrelevant associations and movements, in the establishment of comparatively fixed neural pathways and patterns which function smoothly and efficiently. This first kind of learning we may call "learning by repetition."[2]

LEARNING BY "INSIGHT"

The second kind of learning differs markedly from learning by repetition. Its object is not proficiency as much as it is understanding and intelligence. The required responses do not at first come easily, or quickly, or accurately. The learning problem is not one simply of perfecting an organization which already exists in somewhat crude form; it is rather the *creation* of such an organization. Repetition, if it is premature, blocks learning, for it can yield only greater efficiency in the organization under practice,—not new organizations. Illustrations of this second kind of learning are to be found wherever meanings are to be acquired. Examples are: the meaning of numbers, of the mathematical processes, and of computational practices (such as the placement of quotient figures in division). For this second kind of learning let us use the term "learning by insight."[3]

[1] Paper read before Section A of the American Educational Research Association, March 2, 1938, Atlantic City, N. J.

[2] I am aware that by some the mere "strengthening of connections" is not regarded as learning.

[3] As used here, the term "insight" is purely descriptive; it implies the operation of no mystical force or faculty.

Results of Failure to Discriminate Between the Two Types of Learning

The distinction I have made between learning by repetition and learning by insight is of course not a new one; but it is a helpful one for our purpose. We still view too many aspects of arithmetic as being acquired through learning by repetition, and when we do so, unfortunate consequences inevitably follow. I shall have time to consider but two such consequences.

1. Misconception concerning course of learning

In the first place, we tend to misconceive the course of arithmetical learning. We expect it to be direct and straight-forward, from the given status to the desired end (Figures I and II). It is as if we were to locate two points on our graph paper, to represent the position of adult and of

Learning "by Repetition"

FIGURE I FIGURE II FIGURE III

child with respect to the ability in question, and then to draw a line to connect the two. Of these points, the adult's position then comes to be the more important. We draw our line *backward*, from adult to child, with an eye to the finished product instead of to the child's struggles to achieve that product. Then too, we allow the adult's performance to determine the character of our training. We ask the child, as nearly as he can, to do precisely what the adult does, in the belief that by so doing the child will mount the learning curve in the most expeditious manner possible.

This conception of the course of learning in arithmetic may or may not be valid when efficiency is the goal and when the method of learning is through repetition. There seems to be some evidence for such a con-

ception when group test scores are plotted and when measures are restricted to data on rate and accuracy of performance. But there is no evidence for such a conception when the goal is understanding, when children are observed intimately amidst their learning difficulties, and when data are collected concerning their thought processes as they progress toward adult attainments.

The course of learning by insight.—In these latter circumstances we find no smooth, steadily rising curve of learning. Rather, we find what appears to be a series of steps, each step representing a new and a more mature way of thinking than the preceding one (Figure III). The series of steps corresponds to a series of progressive re-organizations in thought. Learning advances through the process of abandoning each lower form of organization in favor of a higher one. In this process of constructing and then of re-constructing patterns of response efficiency fluctuates widely,—rate and accuracy may suffer temporary losses at the same time that a gain is being realized in level of thinking.

That the course of learning by insight differs from that of learning by repetition has been demonstrated by research,—by research in which, for the most part, children themselves rather than their test papers have been the subjects of study.

Research evidence: 1. Rational counting.—Judd,[4] Woody,[5] and the writer,[6] among others, have reported concerning children's thought procedures in grasping the number of grouped objects. These procedures are easily arranged in a genetic series: (1) inaccurate "counting" in which absurd errors are made and ignored; (2) isolation of the separate items one at a time, at first slowly, inaccurately, and accompanied by much bodily movement; (3) partial and unsystematic use of a smaller group within the total, supplemented by counting; (4) more systematic use of sub-groups through the application of familiar addition techniques; and (5) finally rapid, accurate adult-like use of larger groups and application of multiplication techniques.

2. Learning the combinations.—Data reported on the way in which children learn the combinations reveal a course of learning quite unlike

[4] Judd, Charles H. *Psychological Analysis of the Fundamentals of Arithmetic.* Supplementary Educational Monograph, No. 32. Chicago: The Department of Education, The University of Chicago. 1927.

[5] Woody, Clifford. "Achievement in Counting by Children in the Primary Grades," *Childhood Education,* VII (1931), 339-45. Also, "The Arithmetical Backgrounds of Young Children," *Journal of Educational Research,* XXIV (1931), 188-201.

[6] Brownell, William A. *The Development of Children's Number Ideas in the Primary Grades.* Supplementary Educational Monograph, No. 35. Chicago: The Department of Education, The University of Chicago, 1928.

that of learning by repetition. In the studies of Chazal,[7] McConnell,[8] and Norem and Knight,[9] to mention but a few of the available reports, one fails to find evidence again of immediate grasp of the facts as such, but rather, evidence of a series of stages in which one way of "knowing" or of thinking about a combination is given up for a more mature way, that for a still more mature way, and so on. Nevertheless, many devices and instructional practices now prevalent for teaching the combinations are ill-adapted to learning by insight. Their nature reveals their source in a theory based upon learning by repetition, and their continued use testifies to the confusion between the two kinds of learning which have been distinguished in this paper.

3. Learning the meaning of percentage.—The research thus far cited deals with arithmetic meanings in the lower grades. But meanings must, of course, be acquired in all the grades. One study, that reported by Edwards,[10] shows that learning by insight differs from learning by repetition as much in the higher as in the lower grades. The Edwards study has to do with percentage. One can hardly read the penetrating analyses and the shrewd deductions in this article without appreciating pupils' efforts to acquire the new meanings,—their failure to transfer, their too complete transfer, interference from earlier learnings, and so on. Clearly, children do not master the advanced arithmetical idea of percentage by being told about it. Our teaching of this topic derives from an implicit reliance upon learning by repetition. Instead of starting instruction with a few textbook pages written from the adult's point of view and instead of concluding instruction with a few dozen unintelligible problems involving adult situations, we need to start the topic sooner, to base our teaching upon children's rather than upon adults' thought processes, and to allow plenty of time for children to reach real understanding.

I am still on my first point: in teaching arithmetical meanings we tend to misconceive the course of learning; we are prone to expect it to resemble the course of learning by repetition rather than that of learning

[7] Brownell, William A., and Chazal, Charlotte B. "The Effects of Premature Drill in Third-Grade Arithmetic," *Journal of Educational Research*, XXVIII (1935), 17-28.

[8] McConnell, T. R. "Discovery versus Authoritative Identification in the Learning of Children." University of Iowa Studies in Education, IX, No. 5; September, 1934. McConnell's unpublished doctoral thesis, of which the above reference is an abstract, is a more satisfactory source.

[9] Norem, Grant B., and Knight, Frederic B. "Learning of the One Hundred Multiplication Combinations," *Twenty-Ninth Yearbook of the National Society for the Study of Education* (1930), 551-568.

[10] Edwards, Arthur. "A Study of Errors in Percentage," *Twenty-Ninth Yearbook of the National Society for the Study of Education* (1930) 621-640.

by insight. I have used three illustrations: (1) the apprehension of the number of concrete objects in groups, (2) the learning of the number facts, and (3) the acquisition of the meaning of percentage. I want to cite one more study, as yet unpublished, which deals with the meaning of a process and of certain computational procedures.[11]

4. Dividing by a fraction.—The study was made by Miss Thelma Tew, now a teacher in the Demonstration School of the Florida State College for Women. Her problem related to the teaching of division of a fraction by a fraction, as in the example $\frac{2}{3} \div \frac{3}{4}$. The school text showed only the usual method of inverting the divisor and multiplying; thus, $\frac{2}{3} \times \frac{4}{3}$. Osburn[12] long ago pointed out the excessive difficulty of rationalizing this method to children and suggested as a substitute the method of the common denominator, in accordance with which the example $\frac{2}{3} \div \frac{3}{4}$ becomes $\frac{8}{12} \div \frac{9}{12}$, or $8 \div 9$. Miss Tew undertook to discover what happens when the method of the common denominator is taught in place of the method of inversion. It was not her intention to leave the children with this method, but rather, after they had shown that they understood it, to teach them the inversion method as a short-cut. This plan is of course not in accord with a theory based on learning by repetition, but it seemed to be logical according to a theory based on learning by insight,—first, understanding; later, skill and efficiency if possible, but in any case understanding.

What were her results? Miss Tew found that her pupils learned to divide by the common denominator method more easily and more intelligently than ever before when she had taught by the inversion method. Their errors, as observed from day to day, were less varied, less frequent, and less persistent. Moreover, comparisons with children taught by the inversion method only were consistently in favor of Miss Tew's group. In the last week of teaching on the unit Miss Tew demonstrated the inversion method and made its use optional. Promptly the more intelligent and more capable children adopted the short-cut, while the slower children stayed with the familiar common denominator method,—which is precisely what they should have done at their stage of development.

[11] In this connection certain published studies might have been cited; for example, those by Burge on multiplication and by Buswell and John on all four fundamental processes. Burge, Lofton V. "Types of Errors and Questionable Habits in Multiplication," *Elementary School Journal*, XXXIII (1932), 185-194. Buswell, Guy T., and John, Lenore. *Diagnostic Studies in Arithmetic.* Supplementary Educational Monograph, No. 30. Chicago: The Department of Education, The University of Chicago, 1926.

[12] Osburn, Worth J. *Corrective Arithmetic, Vol. II* (Boston: Houghton Mifflin, 1929), page 50 ff.

The results secured by Miss Tew with this one computational form raise interesting questions with regard to many other forms. Perhaps in teaching for understanding we shall some day depart from the well-nigh universal practice of offering children but one of several alternative forms of computation. Miss Tew taught one form for initial understanding, but later taught another form for greater efficiency. Similarly, we may eventually decide to teach subtraction of whole numbers by the method of decomposition, because this method can be easily explained to children, but later, in grade vi, or vii, or viii, we may want to teach the method of equal additions because this method makes for greater efficiency at the same time that it allows us to teach a new and important mathematical principle. Such changes will not of course be made so long as we persist in confusing learning by repetition with learning by insight in the case of arithmetical meanings.

Summary.—To summarize my first point: in much of our instruction we expect too rapid improvement, and so shorten unduly the period of learning; we design learning activities according to the final adult pattern, and not according to children's capabilities and difficulties; and we concern ourselves too little with the arrangement of experiences which will lead to the orderly development of understanding. These questionable practices arise, at least in part, from misconceptions with regard to the course of learning when meanings are involved, and these misconceptions, in turn, arise from failure to discriminate between learning by repetition and learning by insight.

2. FALSE NOTIONS OF ECONOMY

There is a second unfortunate consequence of confusing the two kinds of learning, namely, false notions of economy. Believing that learning should proceed in a straight line without break or interruption, we deprecate any instructional practice which takes children even momentarily off the main highway.

Proscription of learning aids.—The practices just referred to are challenged by invoking the principle, "Form no habits which must later be broken," thus overlooking the limiting phrase "other things being equal," which is an essential part of the principle. So, the second-grade teacher insists that when 2 and 3 are to be added, the statement must be "two plus three are five;" when 3 is to be subtracted from 5, the statement must be "five minus three are two;" and when 2 is to be multiplied by 3,

the statement must be "three times two are six." The mere fact that "and" is superior to "plus," "take away" is superior to "minus," and "three twos" is superior to "times," is to her of slight moment when compared with the fact that eventually children will use the more technical terminology. To teach the child-like forms of expression, she thinks, is to teach habits which must later be broken.

Our false notions with respect to learning economy are leading us, I believe, needlessly to increase the difficulty of arithmetic for its learners. We withhold from children temporary aids and helps in the fear that these may become permanent. Thus, some would forbid counting at any time in dealing with the number combinations, and others would proscribe the use of the fingers and the hands to represent numbers and number facts. Opposition to these practices is consistent with a theory of learning by repetition, but not with a theory of learning by insight.

Crutches.—In the group of banned aids and helps are the so-called crutches of arithmetic, such as writing the carried number at the top of the column. Crutches are habits which must later be broken; at best they are uneconomical, and at worst they are harmful. So runs the argument,—but with a striking absence of supporting data. One is forced to the conclusion that the argument has been deduced in part from casual observation, but chiefly from a conception of learning which has only limited application in arithmetic.

Research evidence: 1. A fraction crutch.—We do have a few data on arithmetic crutches. Some years ago a complete report[13] was made concerning a particularly cumbersome crutch found in two fifth-grade classes in Nashville, Tennessee. The crutch had been presented by the teacher ostensibly to simplify learning to add fractions. The data showed that the children who had been taught the crutch added common fractions as efficiently as did the non-crutch children. Furthermore, the data showed that the crutch children tended to lay aside the artificial device as soon as they could get along without it. There was, then, no evidence that this crutch impeded learning or that, once learned, it remained a perament part of the children's arithmetical behavior.

2. A subtraction crutch.—More recently we have been making a study of another crutch,—a crutch which, so far as I know, appears in no pub-

[13] Brownell, William A. "An Evaluation of an Arithmetic Crutch," *Journal of Experimental Education*, II (1933), 5-34. See also the article by the same author: "The Place of Crutches in Instruction," *Elementary School Journal*, XXXIV (1934), 607-619.

lished text. I may illustrate from the example 746 − 238, in which borrowing from tens' place is called for. Some texts teach children to cross out the 4 of the minuend and to write a small 3 above it, but we went farther than this: we taught children also to insert a small 1 before the last figure of the minuend, thus changing 6 to 16 in a visible fashion, as shown at the right. The data obtained from this study have not yet been completely tabulated, but I can report in general terms what we have found.

$$\begin{array}{r} {}^{3}\\ 7\,{}^{1}\!\not{4}\,{}^{1}6 \\ -\,2\,3\,8 \\ \hline 5\,0\,8 \end{array}$$

The experiment involved sixteen third-grade classes in four North Carolina cities. The total of nearly 600 pupils were divided into four sections, each of which furnished usable data on about 100 cases. One section was not taught the crutch. The other three sections were taught the crutch and were required to use it for varying periods of time, one of the three sections throughout the whole of the experiment proper. In one of the other two crutch sections use of the crutch was forbidden after a short period, and in the fourth section, beginning at the same time, the crutch was made optional with the usual shorter form. Two weeks after suspension of instruction a test, the fourth in the series, was administered to all pupils.

Data were collected both on efficiency in subtraction (rate and accuracy of work) and on actual use of the crutch. The evidence is that the crutch made important contributions in the early stages of learning; that its use slowed up work, not at all at first, but slightly later on, when it was really no longer needed; and that in the vast majority of cases the crutch was discarded easily and without urging on the part of the teachers. Practically all exceptions to the last statement occurred in the classes of teachers who were directed to insist upon continued use of the crutch. One interesting finding was that, on demand, even these latter children put aside the crutch and subtracted as well without it as with it.

Summary.—You will not misunderstand my position. I am not, of course, urging that we should uncritically adopt every supposed learning aid which is put forward; nor am I urging that we should unduly encumber learning by stupidly introducing aids merely because we can do so. But I am suggesting that we may be complicating learning because of our unwarranted fears concerning the function of aids and helps at the time of learning and concerning their subsequent history. Moreover, I am suggesting that here is a fruitful field for research on the learning and teaching of arithmetic.

CONCLUDING STATEMENT

To conclude: mastery of arithmetic calls for two types of learning,—learning by repetition and learning by insight. These two kinds of learning necessitate quite different activities on the part of teacher and of pupil. We commonly fail to recognize these facts, and we are inclined to think of arithmetic as being wholly or predominantly acquired through repetition. Two unfortunate consequences have been considered. First, we mistakenly expect improvement in learning arithmetical meanings to follow a course similar to that for efficiency, and so we shorten the period of instruction, hasten the pace of learning, and model practice after adult (or expert) patterns. Second, we entertain false notions regarding economy in learning and tend to deny to children aids which may contribute much to growth of rich, meaningful concepts. These, and other doubtful practices will disappear as we come better to understand learning by insight and more truly to evaluate its importance in arithmetic.

A COMPARATIVE ANALYSIS OF THE VOCABULARIES OF TWENTY-NINE SECOND READERS

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THE IMPORTANCE OF VOCABULARY DATA

TEACHERS and textbook committees are becoming convinced of the importance of careful vocabulary control in reading materials for the primary grades. This is partly due to an increasingly critical attitude toward all aspects of the teaching of reading and to recognition of the great importance of an abundance of easy, interesting reading material for primary pupils. Earlier reports presented basic vocabulary data for a large number of primers[1] and first readers.[2] The purpose of the present report is to make available similar data on the vocabularies of most of the second readers now widely used in the schools. There is no intent to evaluate the relative merits of the several books. It would be fallacious to assume that the best book is the shortest, the longest, or the one nearest the median, or that it is the one with the smallest, largest or median vocabulary burden. There is, undoubtedly, no one best book. All of the books included have merit, and many of them will be read by the children in any second grade. The writer's assumption is that teachers and textbook committees will be able to select and use the various books more intelligently and effectively if they have available the comparable data here presented. Several other factors such as content, attractiveness, cost, and availability must be considered simultaneously with vocabulary information. The writer has completed an analysis of the content of readers for the first three grades, which will be published shortly.

PROCEDURES EMPLOYED

The procedure used in analyzing the second reader vocabularies was to go through each book, page by page, and record every different word found in the book. A skeleton list of some 1500 common words was used as a basis for the list for each book. If a given word were on the skeleton list, it was checked; if not, it was written in. Common derived forms were included with the root form. The attempt was to follow the rules

[1] Hockett, John A., and Neeley, Deta P. "A Comparison of the Vocabularies of Thirty-three Primers," *Elementary School Journal*, XXXVII (November, 1936), 190-202.

[2] Hockett, John A., and Neeley, N. Glen. "The Vocabularies of Twenty-eight First Readers," *Elementary School Journal*, XXXVII (January, 1937), 344-352.

employed by Thorndike in his *Teacher's Word Book*.[3] Plurals in "s" or where "y" is replaced by "ies," adverbs in "ly," comparatives and superlatives in "er" or "r," and "est" or "st," verb forms ending in "s," "d," "ed," "ing," and a few other variants were all considered the same as the basic form. Compound words such as "sunflower" were not considered new words if the separate words of which they are composed appeared in the book. Several common words such as "something," "myself," and "anyone," which are included in the Gates list, were retained as separate words. A rigorous attempt was made to be consistent with respect to the 29 different books.

After the list for each book was completed, it was compared with the Gates Word List,[4] and a count was made of the number of words in the list found in each section of five hundred words of the Gates list. In a number of cases the list for the book was checked with the list supplied by the publisher. The number of running words in the book was determined by counting the words on each page, writing the numbers at the bottom of the pages and adding these on an adding machine. The table of contents, word list in the back of the book, and all explanatory material for the teacher were excluded from the count. A great amount of effort was expended in checking the various steps and in seeking to avoid errors. It is not conceivable, however, that two independent analyses of this nature would agree perfectly.

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Second Readers Included

(Arranged alphabetically by publisher)

1. White, Margaret L., and Hanthorn, Alice. *Stories of Animals and Other Stories.* Do and Learn Readers. Chicago: American Book Co., 1930.
2. Suzzallo, Henry, Freeland, George E., McLaughlin, Katherine L., and Skinner, Ada M. *Fact and Story Readers.* Chicago: American Book Co., 1930.
3. Leavell, Ullin W., Breckinridge, Elizabeth G., Browning, Mary, and Follis, Hattie. *The Friendly Hour.* Chicago: American Book Co., 1936.
4. Baker, Clara B., and Baker, Edna D. *Bobbs-Merrill Readers.* Indianapolis, Indiana: Bobbs-Merrill Co., 1924.

[3] Thorndike, Edward L. *A Teacher's Word Book of Twenty Thousand Words.* New York: Teachers College, Columbia University, 1931.

[4] Gates, Arthur I. *A Reading Vocabulary for the Primary Grades.* New York: Teachers College, Columbia University, 1935 (revised).

5. Baker, Clara B., Reed, Mary Maud, and Baker, Edna Dean. *Friends Here and Away.* The Curriculum Readers. Indianapolis, Indiana: Bobbs-Merrill Co., 1934.
6. Buckingham, B. R., and Buckingham, Bertha H. *Munching Peter.* The Children's Bookshelf. Boston: Ginn & Co., 1934.
7. Pennell, Mary E., and Cusack, Alice M. *The Children's Own Readers.* Boston: Ginn & Co., 1929.
8. Cordts, Anna Dorothea. *The New Path to Reading.* Boston: Ginn & Co., 1929.
9. Smedley, Eva A., and Olsen, Martha C. *The Smedley and Olsen Series.* Chicago: Hall & McCreary Co., 1928.
10. Harris, Julia M. *Visits Here and There.* Child Development Readers. Boston: Houghton Mifflin Co., 1935.
11. English, Mildred, and Alexander, Thomas. *Wheels and Wings.* Happy Hour Readers. Richmond: Johnson Publishing Co., 1935.
12. Geeks, Mathilde C., Skinner, Charles E., and Withers, John W. *Trips to Take.* Story and Study Readers. Richmond, Virginia: Johnson Publishing Co., 1928.
13. Dressel, Herman, Veverka, M. Madilene, and Robbins, May. *The Laidlaw Readers.* Chicago: Laidlaw Bros., 1928.
14. Ringer, Edith Hope, and Downie, Lou Chase. *School Days.* Citizenship Readers. Philadelphia: J. B. Lippincott Co., 1930.
15. Freeman, Frank N., Storm, Grace E., Johnson, Eleanor M., and French, W. C. *Child-Story Readers.* Chicago: Lyons & Carnahan, 1927.
16. Storm, Grace E. *Friends About Us.* Guidance in Reading Series. Chicago: Lyons & Carnahan, 1936.
17. Gates, Arthur I., and Huber, Miriam Blanton. *Friendly Stories.* The Work-Play Books. New York: Macmillan Co., 1930.
18. Dopp, Katherine E., Pitts, May, and Garrison, S. C. *Outdoors and In.* Happy Road to Reading. Chicago: Rand McNally & Co., 1935.
19. O'Donnell, Mabel. *Friendly Village.* Alice and Jerry Books. Evanston, Illinois: Row, Peterson & Co., 1936.
20. Elson, William H., Runkel, Lura E., and Gray, William S. *The Elson Basic Readers.* Life-Reading Program. Chicago: Scott, Foresman & Co., 1931.
21. Hanna, Paul R., Anderson, Genevieve, and Gray, William S. *Susan's Neighbors at Work.* Social Studies. Chicago: Scott, Foresman & Co., 1937.
22. Grady, W. E., Klapper, Paul, and Gifford, Jane C. *Stories for Every Day.* Childhood Readers. New York: Charles Scribner's Sons, 1932.
23. Martin, Cora M. *Tales and Travels.* Real Life Readers. New York: Charles Scribner's Sons, 1930.
24. Coleman, Bessie Blackstone, Uhl, Willis L., and Hosic, James Fleming. *The Pathway to Reading.* Newark, New Jersey: Silver, Burdett & Co., 1925 and 1932.

25. Smith, Nila Banton. *Round About You.* The Unit-Activity Reading Series. Newark, New Jersey: Silver, Burdett & Co., 1935.
26. Stone, Clarence R., Stone, Anne Lotter, assisted by Vandergaw, Ida. *Joyful Reading.* The Webster Readers. St. Louis, Missouri: Webster Publishing Co., 1932.
27. Hardy, Marjorie. *New Stories.* The Child's Own Way Series. Chicago: Wheeler Publishing Co., 1928.
28. Lewis, William Dodge, and Gehres, Ethel Maltby. *New Friends.* The New Silent Readers. Philadelphia: John C. Winston Co., 1931.
29. Firman, Sidney G., and Gehres, Ethel Maltby. *The New Winston Readers.* Philadelphia: John C. Winston Co., 1929.

BASIC VOCABULARY DATA

The basic vocabulary data for each book are presented in Table I. The total number of running words is given in the second column, followed in column three by the figure which shows the ratio of the total number of words in each book to the median number for all the books. The number of different words in each book appears in column four, with the ratio of the number of different words in each book to the median number in column five. The average repetition or ratio of the number of running words to the number of different words for each book is given in column six. The ratio of each value in column six to the median value for all the books appears in column seven.

From column two we see that the books range in length from 9,913 words to 34,834 words with a median length of 20,968 running words. The middle 52 percent of the books range from 17,697 words to 22,427 words. The longest book contains 3.5 times as much material as the shortest. The range in number of different words is from 548 to 1470 with median of 1022 words. The middle 52 percent range from 908 to 1130 different words. The ratio of running words to different words varies from 13.0 to 35.9, with median value of 19.4.

COMPARISON WITH THE GATES WORD LIST

The results of comparing the vocabulary of each book with the Gates list of 1811 words are presented in Table II. The number of different words in each book is given in column two. The number and the percentage of these words that appear in the first five hundred of the Gates list are given in columns three and four, respectively. Similar data for the three succeeding levels of the Gates list are presented in columns five to ten. The next two columns give the number and percentage of words not

TABLE I

BASIC VOCABULARY DATA ON TWENTY-NINE SECOND READERS

Name of Reader	Total Number of Words	Ratio of Total Number of Words in Each Book to Median	Number of Different Words	Ratio of Number of Different Words in Each Book to Median	Average Repetition	Ratio of Average Repetition of Each Book to Median
1. Do and Learn	20,352	.97	1247	1.22	16.3	.84
2. Facts and Story	17,229	.82	1128	1.10	15.3	.79
3. Friendly Hour	20,510	.98	1013	.99	20.2	1.04
4. Bobbs-Merrill	18,801	.90	969	.95	19.4	1.00
5. Curriculum	20,888	1.00	819	.80	25.5	1.31
6. Children's Bookshelf	34,834	1.66	1022	1.00	34.1	1.76
7. Children's Own	22,082	1.05	1117	1.09	19.8	1.02
8. New Path, Revised	21,918	1.05	1149	1.12	19.1	.98
9. Smedley and Olsen	12,276	.59	853	.83	14.4	.74
10. Child Development	21,004	1.00	1130	1.11	18.6	.96
11. Happy Hour	20,981	1.00	934	.91	22.5	1.16
12. Story and Study	21,996	1.05	1283	1.26	17.1	.88
13. Laidlaw	16,853	.80	1159	1.13	14.5	.75
14. Citizenship	14,081	.67	1109	1.09	12.7	.65
15. Child-Story	24,968	1.19	1470	1.44	17.0	.88
16. Guidance	17,697	.84	832	.81	21.3	1.10
17. Work-Play	15,703	.75	937	.92	16.8	.87
18. Happy Road	22,866	1.09	921	.90	24.8	1.28
19. Alice and Jerry	23,525	1.12	796	.78	29.6	1.53
20. Elson-Gray	22,545	1.08	908	.89	24.8	1.28
21. Social Studies	19,657	.94	548	.54	35.9	1.85
22. Childhood	16,987	.81	958	.94	17.7	.91
23. Real Life	9,913	.47	765	.75	13.0	.67
24. Pathway, Revised	20,525	.98	1121	1.10	18.3	.94
25. Unit-Activity	23,050	1.10	884	.86	26.1	1.35
26. Webster	22,427	1.07	1109	1.09	20.2	1.04
27. Child's Own Way	24,438	1.17	1217	1.19	20.1	1.04
28. New Silent	20,968	1.00	1283	1.26	16.3	.84
29. New Winston	21,718	1.04	1096	1.07	19.8	1.02
Median	20,968		1022		19.4	

included in the Gates list. The last column reveals the percentage of words in the first thousand of the Gates list.

The data show that the percentage of words from the first five hundred of the Gates list ranges from 23 percent to 54 percent, with median at 40 percent. The percentage for the middle 52 percent of the books varies from 36 percent to 45 percent. In the median book, 66 percent of the different words are found in the first thousand of the Gates list. The total range, however, is from 54 percent to 74 percent, and for the middle 52 percent of the books the range is from 60 percent to 70 percent. The range for words outside the Gates list is from 7 percent to 22 percent, with median at 14 percent.

TRENDS IN SECOND READER VOCABULARIES

If we compare the vocabularies of second readers published during the past three four-year periods, we find a considerable reduction in vocabulary load. The average number of different words in eight books published before 1930 (including one in 1924) is 1146. The average for ten books published 1930-1933 is 1057, a reduction of 89 words, or 8 percent. Eleven books published 1934-1937 average only 913 different words, a further reduction of 144 words, and of 14 percent from the average for the preceding period. In ratio of running words to different words the

TABLE II

COMPARISON OF VOCABULARIES OF TWENTY-NINE SECOND READERS WITH REVISED GATES WORD LIST

Name of Reader	Number of Different Words	Words Found in Gates List: In First 500		In Second 500		In Third 500		In Fourth 311		Words Not in Gates List		Percent in First 1000
		No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	
1. Do and Learn	1247	429	34	272	22	197	16	90	7	259	21	56
2. Fact and Story	1128	420	37	259	23	187	17	84	7	178	16	60
3. Friendly Hour	1013	422	42	249	25	152	15	52	5	138	14	66
4. Bobbs-Merrill	969	379	39	205	21	122	13	75	8	188	19	60
5. Curriculum	819	413	50	189	23	81	10	34	4	102	12	74
6. Children's Bookshelf	1022	439	43	269	26	130	13	53	5	131	13	69
7. Children's Own	1117	427	38	297	27	171	15	93	8	129	12	65
8. New Path, Revised	1149	431	38	270	23	177	15	81	7	190	17	61
9. Smedley and Olsen	853	399	47	203	24	116	14	50	6	85	10	71
10. Child Development	1130	401	35	258	23	159	14	69	6	243	22	58
11. Happy Hour	934	423	45	272	29	129	14	36	4	74	8	74
12. Story and Study	1283	447	35	327	25	229	18	105	8	175	14	60
13. Laidlaw	1159	410	35	282	24	206	18	87	8	174	15	60
14. Citizenship	1109	399	36	260	23	177	16	82	7	191	17	59
15. Child Story	1470	338	23	449	31	328	22	252	17	103	7	54
16. Guidance	832	367	44	194	23	107	13	29	3	135	16	67
17. Work-Play	937	415	44	241	26	137	15	53	6	91	10	70
18. Happy Road	921	413	45	222	24	120	13	49	5	117	13	69
19. Alice and Jerry	796	391	49	188	24	101	13	37	5	79	10	73
20. Elson-Gray	908	422	46	253	28	123	14	46	5	64	7	74
21. Social Studies	548	294	54	104	19	41	7	19	3	90	16	73
22. Childhood	958	412	43	253	26	148	15	41	4	104	11	69
23. Real Life	765	359	47	178	23	90	12	29	4	109	14	70
24. Pathway	1121	413	37	283	25	193	17	94	8	138	12	62
25. Unit-Activity	884	406	46	202	23	108	12	41	5	127	14	69
26. Webster	1109	447	40	307	28	172	16	58	5	125	11	68
27. Child's Own Way	1217	404	33	284	23	199	16	83	7	247	20	57
28. New Silent	1283	444	35	308	24	215	17	84	7	232	18	59
29. New Winston	1096	439	40	288	26	189	17	77	7	103	9	66
Median	1022	—	40	—	24	—	15	—	6	—	14	66

averages for the three periods are, respectively: 17.8, 17.1, 25.2. Similar trends in the vocabularies of primers and first readers were reported in the articles already cited. Additional evidence of increased attention to vocabulary control is furnished by the average percentage of words within the first thousand of the Gates list for the three periods,—61.6 percent, 64.7 percent, 68.5 percent, respectively.

SUMMARY

By way of summary, we may note that the typical second reader is a book of about 21,000 words, which is more than twice the length of the average first reader and four times the length of the average primer. The average second reader contains slightly over one thousand different words, if common derived forms are not counted separately. This number, again, is about twice that of the typical first reader. The variation in books designated as second readers is so great, however, that the longest one contains more than three times as much reading material as the shortest, and the most extensive vocabulary is almost three times that of the most limited one. The shortest second reader, in fact, contains less than half as much material as the longest first reader, and the most restricted second reader vocabulary is considerably less than the vocabulary of several of the first readers.

NEEDED RESEARCH IN MUSIC EDUCATION *

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EACH year larger numbers of music educators begin work for higher degrees. Usually the degree sought, whether Master of Education, Master of Arts, Doctor of Education, or Doctor of Philosophy, carries a thesis requirement. Although research in music education is not limited to degree candidates, it is evident that this type of work is of increasing interest to teachers of music. A recent survey of the way investigations in education are distributed among subject fields shows music second only to English during the years 1929-1934, with no less than 77 studies in this period (6, p. 45).

But where shall the specialist in music, in the novel and perhaps uncomfortable role of prospective research worker, turn for a problem? Remembering tests of musical talent and the ubiquitous questionnaire, he is far too apt to conceive of the possibilities merely in terms of these instruments. Studies of individual differences and of present educational practices are of course highly desirable, but certainly will not answer all the perplexing questions confronting music educators. Nor has the typical student the privilege of working with the costly instruments available in a few laboratories of musical psychology (13). The purpose of this paper is to suggest some additional techniques and areas for investigation.

School administrators as well as music teachers may find interest in a listing of problems in a field sometimes classified among "fads and frills." Certain of the studies proposed bear upon the justification for music in the curriculum. Some of them might be undertaken by school executives or by their staff specialists in music, with a view to arousing public interest as well as to the solution of professional problems.

The problems to be indicated derive from two sources, in general. (1) A problem may be suggested by a knowledge of the tools available to research workers. Thus in a later paragraph it is proposed to apply the case-study technique to "problem children" in music. Fortunately, ex-

* The 1936 Yearbook of the Music Educators National Conference, published since this paper was prepared, contains a number of suggestions for research in music education, and a list of projects recently completed or under way. The studies described and proposed are derived in the main from practical problems confronted by music educators, whereas those here suggested largely represent a transfer to music of problems in general educational and psychological theory. Consequently there is little if any overlapping.

cellent manuals on research methodology are available (6). Study of these should suggest additional problems. (2) There may be a direct transfer to music education of a problem or technique found significant in the study of educational psychology or educational method. Here the student may find justification for the general professional courses, surveying educational theory, psychology, and procedures, which his graduate adviser prescribes for him. For example, techniques for studying transfer of training, developed in the psychology laboratory, may be carried over quite directly to music education.

Students of music should not expect workers in other fields to point out all the applications. Probably music educators will secure their best insights by approaching these other areas with an eye open for parallels with their own problems. The present suggestions are a by-product of the reverse of this process. The writer knows music and music education only as a layman. Recently he was asked to give a series of lectures on the psychology of music. The paucity of material on many important issues indicated a need for more vital research. Surely, competent musicians who will take the trouble to familiarize themselves with other fields of educational investigation will be able greatly to extend and clarify the following hints.

1. *Reminiscence and the Management of Practice.*—Children memorizing poetry have been found to recall more of a partially learned verse after two days than at the end of a study period (1, 15). Psychologists call this phenomenon "reminiscence." It is more widespread than was at first believed. Muscular skills sometimes seem to improve after days or weeks without practice. Is reminiscence in this sense a fact of musical learning? If so, how can music educators take advantage of it? Experimental data are needed.

2. *Adult Learning of Music.*—Thorndike has said, "In general, nobody under forty-five should restrain himself from trying to learn anything because of a belief or fear that he is too old to be able to learn."(19) He cites studies of adult learning in many fields, but not in music. Many adults are turning to musical activity as a resource for increased leisure time, and more should be. What special problems confront the adult learner in this field? What are his prospects and what are his limitations? A review of the work mentioned suggests a variety of approaches.

3. *The Improvement of Auditory Imagery.*—With the discovery that some children have extraordinarily vivid visual images (eidetic images) psychologists have revived an earlier interest in imagery (14, pp. 589-

600). The writer confesses a complete inability to hear tones in imagination. Some of his musical friends possess this power to a high degree. It is claimed that it can be developed (11, pp. 169-171). Introspective data secured in connection with various types of training alleged to develop tonal imagery would be illuminating.

4. *Eye-Movements in Reading Music.*—The teaching of primary reading has been transformed within a generation by studies of the way the eyes adjust to the printed page in skillful and unskillful reading (8). Recently elaborate apparatus devised at the University of Chicago for photographing eye movements in reading has been adapted to a study of eye movements in looking at pictures (2). Since printed music has two dimensions rather than a strictly linear form, this new apparatus should lend itself to important studies in reading music. A good beginning has been made in applying this technique to music (20).

5. *Learning Curves in Music.*—Laboratory studies of improvement show irregular rather than steady gains to be the rule. "Curves" of learning display the facts graphically (9). Plateaus—periods of no apparent progress—are familiar in the experience of music students and teachers. Analysis of the irregularities, setbacks, delays, and sudden advances in musical learning is greatly needed. One of the hardest parts of this problem is to discover or devise suitable criteria for measuring improvement.

6. *Transfer of Training in Music.*—Charges are sometimes made that music schools teach theoretical music and applied music in insolation; that pupils "study piano" but do not study "music"; that appreciation is "just another course," without bearing upon actual life. Such statements are a challenge to research workers. How much difference in practice teaching in school music does a course in harmony make, for example? At a lower level one might ask what effect experience in a first-grade toy band has upon third- and fourth-grade music. Do courses in appreciation really increase the hours devoted to listening to good music? An appropriate technique for such studies utilizes experimental and control groups —the former having the special training in question, and the latter matched with the former so far as possible, except for the absence of the training factor (6, ch. IX).

7. *Music Readiness.*—The readiness of children for reading instruction, for primary arithmetic, for foreign languages, and for other subjects has been studied, with varying results. What factors determine readiness to profit by various types of music instruction? What mental age is

needed for a grasp of musical notation? What outcomes may be expected when piano lessons are forced upon an unwilling boy of nine? Studies of reading readiness, in particular, provide models for an attack upon these problems (7, 17).

8. *Conditions Favoring Musical Creativity.* — Not a great deal is known as to the general psychology of creative production (4). In music most available information concerns the methods of professional composers. But interest is increasing in childish endeavors to compose music. It has even been said that such efforts may be made the basis for learning musical notation (11). What are the conditions in childhood favoring musical creativity? It would be helpful to secure detailed analyses of the steps by which an individual or group composition emerges, and it might be far easier to get this in childhood than for mature persons (although adult studies are of course needed). Classrooms conducting an activity program may well provide opportunity for significant observations of creative work.

9. *Attitudes Toward Music.*—Scales for the measurement of attitudes toward religion, various races, the movies, and other areas of experience in which people have strong convictions have been devised by Thurstone and his students (12). One or more such scales in the field of music could be developed by the same techniques. Attitudes toward "classical" music, "modern" music, "swing" music, etc., could be dealt with separately. These scales would make possible significant studies as to the relation of musical training and experience to attitudes—e.g., of changes in attitudes due to playing in a school orchestra or to a radio course in music appreciation.

10. *Interests of Musicians.* — Fryer (5) and Strong (18) have described methods of studying interests, with special reference to vocational guidance. To trace the development of interests in eminent musicians, or even in students in musical conservatories, would have potential value. Fryer suggests many lines of attack upon this problem. From another angle, interests in music, as revealed in the spontaneous play of children, would be a significant area for study.

11. *Early Development of Eminent Musicians.*—The childhood and growth of eleven of the most eminent musicians of all time have been studied by Cox, in comparison with equally eminent men in other vocations (3). The number of musicians in this investigation is too small to give a clear picture of the emergence of musical genius and the distinctive conditions for its appearance. A more extended study might shed

light on the relative functions of an "inner urge" and a "stimulating environment" in the growth of musicality. Stanton has analyzed the life histories of six distinguished musicians of to-day (16), but the number is small and the basis of selection might well be broadened.

12. *Clinical Studies of Musically Deficient Children.*—Able work has been done for a number of years in analyzing and overcoming what appear to be special deficiencies in children's abilities to master certain school subjects (10). Such work proceeds along case-study lines, and involves testing, diagnosis, and remedial measures. The best work on disabilities in reading, arithmetic, and spelling may be suggestive of procedures for studying musical "problem children." Causation may range from partial deafness (said to characterize over three million American school children) to shyness, and treatment may be equally diversified. A series of such case studies not only would help teachers meet individual needs better, but would doubtless reveal a host of new problems for research.

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AN EVALUATION OF THE EFFECTS OF MARKS AS INCENTIVES TO PUPIL GROWTH IN SPELLING ABILITY AND OF THE COMPARATIVE VALUES OF EQUATED SCALES AND INFORMAL TESTS AS MEASUREMENTS OF THE PROGRESS

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THE orthodox theory of awarding marks as incentives for children in school has frequently been challenged. Discussions of the problem have generally been based on opinion. This paper reports a study conducted to evaluate the effects of marks as incentives to pupil growth in spelling ability and to determine the comparative values of standardized scales and informal random-sampling tests as measurements of such progress.

Subjects and procedure.—Experimental and control situations were arranged among all English classes at Jefferson Junior High School, Minneapolis. A determined effort was made to have a representative sampling of classes in both groups. The experimental group was used to emphasize the social value of correct spelling and the learning to spell the words for the resulting self-satisfaction of such accomplishment. No scores were recorded for this group. The control group was used to emphasize the conventional method of teaching spelling in which marks were recorded systematically. A definite attempt was made to make this group "mark conscious."

At the beginning of the semester three tests were given to all pupils—the Van Wagenen Spelling Scale, the Minneapolis Spelling Scale, and the local Jefferson Tests. The Van Wagenen and Minneapolis Spelling Scales are equated scales measuring general spelling ability. The Jefferson Tests are random-sampling tests of the words to be studied by each grade division, developed by choosing every fifth word in each grade list. There are 50 words in each of these informal tests. About 250 words are studied by each grade division during a semester. These tests were given again at the end of the semester.

Usable data were secured on 958 cases on the Van Wagenen Scale, 562 on the Minneapolis Scale, and 567 on the Jefferson Tests.

A perusal of the data will show that an attempt has been made to be consistent in its compilation. The equated-scales data were analyzed statistically, while for the data from the informal random-sampling tests the mean and mid raw scores were deemed to be as far as reliability would permit.

Criteria for Evaluation.—The gain represented by the comparison of end-semester scores and beginning-semester scores on the Van Wagenen and Minneapolis Scales of the experimental group, as compared with the gain represented by the similar scores on the control group, was taken as the criterion for determining the effects of marks upon pupil growth in spelling ability. The scale scores on the Van Wagenen and Minneapolis Scales represent the measurement of general spelling ability. To determine the comparative values of standardized scales and informal random-sampling tests as measurements of the pupil growth, the gain represented by the comparison of the end-semester scores and beginning-semester scores on the Jefferson Tests for both groups, as compared with the gain represented by the similar scores on the Van Wagenen and Minneapolis Scales, was taken as the criterion.

Data.—The dispersion of gain of end-semester scores over beginning-semester scores on the Van Wagenen and Minneapolis Scales in the experimental group and control group (Table I) shows through an examination of both the means and the medians a consistent superiority in gain in spelling ability of the former group over the latter. Considering the means and in order to determine whether the differences between the means of the experimental group and the control group are significant or not, the differences between the means of the correlated measures, their probable errors, and the ratios between the differences and their probable errors were calculated (Table II). Whenever the difference between two means is equal to or greater than three times the probable error of the difference, this difference is considered to be statistically significant. In all instances the critical ratios between the several means, as given in the last column of Table II, appear definitely to be significant, since the ratios exceed the standard of 3.

Particular attention is called to the differences in means of the experimental group and control group as presented by the data of the equated scales and the informal random-sampling tests. In a comparison of means and medians of the Jefferson Tests data for both experimental and control groups (Table I), it will be noticed that there is a definite reversal of results as when the Van Wagenen and Minneapolis Scales data are considered. The end-semester scores over the beginning-semester scores of the Jefferson Tests in the experimental group and control group show a consistent superiority in gain of the latter group over the former.

The data point out that while the difference in the mean gain among the ninth grade pupils for the Van Wagenen Scale is $1.5 \pm .276$ scale

TABLE I

DISPERSION OF GAIN OF END-SEMESTER SCORES OVER BEGINNING-SEMESTER SCORES IN THREE SPELLING TESTS
(Experimental Group vs. Control Group)

Test and Group	M	Md	PE$_M$ ±	SD	PE$_{SD}$ ±	N	Range
9th Grade							
Van Wagenen—							
Experimental	5.7	5.5	.234	4.32	.165	159	— 8.5 : 18
Control	4.2	4	.148	4.48	.086	416	— 9.5 : 22
Minneapolis—							
Experimental	3.9	5.5	.395	7.70	.383	172	—18 : 30
Control	3.1	3	.492	8.52	.337	135	—22 : 22
Jefferson—							
Experimental	5.4	4				162	— 3 : 22
Control	6.2	5				148	— 2 : 18
7th and 8th Grades							
Van Wagenen—							
Experimental	6.1	5.5	.333	5.49	.235	125	— 7.5 : 38.5
Control	3.8	4	.141	3.43	.102	258	— 7 : 13.5
Minneapolis—							
Experimental	6.0	5	.604	4.57	.419	27	— 5 : 15
Control	3.6	4	.285	6.28	.270	220	—22 : 20
Jefferson—							
Experimental	12.0	14				33	—13 : 24
Control	13.7	14				224	— 2 : 35
All Grades							
Van Wagenen—							
Experimental	5.9	5.5	.195	4.91	.138	284	— 8.5 : 38.5
Control	4.0	4	.142	5.49	.101	674	— 9.5 : 22
Minneapolis—							
Experimental	6.0	5.5	.358	7.60	.330	207	—18 : 30
Control	3.4	3	.147	4.14	.104	355	—22 : 22
Jefferson—							
Experimental	6.5	6				195	—13 : 24
Control	10.5	9				372	— 2 : 35

TABLE II

DIFFERENCES BETWEEN THE MEANS OF THE EXPERIMENTAL GROUP AND THE CONTROL GROUP TOGETHER WITH THE PROBABLE ERRORS OF THE DIFFERENCE BETWEEN THE MEANS, CORRELATED MEASURES, AND THE CRITICAL RATIOS BETWEEN THE TWO GROUPS

Tests Compared	$M_1 - M_2$	$PE_{M1 - M2}$ ±	Critical Ratio
9th Grade			
Van Wagenen	1.5	.276	5.43
Minneapolis	2.8	.630	4.44
Jefferson	— .8		
7th and 8th Grade			
Van Wagenen	2.3	.347	6.62
Minneapolis	2.4	.667	3.39
Jefferson	—1.7		
All Grades			
Van Wagenen	1.9	.241	7.88
Minneapolis	2.6	.386	6.73
Jefferson	—4.0		

points and for the Minneapolis Scale is 2.8 ± .630 scale points in favor of the experimental group, the difference is .8 raw score points in favor of the control group for the Jefferson Tests. Similarly for the seventh and eighth grade group, the equated scales data show 2.3 ± .347 scale points in favor of the experimental group for the Van Wagenen Scale and 2.4 ± .667 scale points in favor of the same group for the Minneapolis Scale, while for the Jefferson Tests the difference in mean gain is 1.7 raw score points in favor of the control group. The data are especially significant when it is noted that for all pupils the equated scales give the experimental group superiority through a mean scale point gain of 1.9 ± .241 for the Van Wagenen Scale and 2.6 ± .386 for the Minneapolis Scale, while the Jefferson Tests give a 4.0 mean raw score gain in favor of the control group.

The differences of the mean scale scores of the Van Wagenen Scale and the Minneapolis Scale show a variation in points. The variation is negligible, however, when it is noted that the unit of measurement in the Van Wagenen Scale is approximately one and one-half times that in the Minneapolis Scale. The Van Wagenen Scale scores are based on the standard deviation as the unit of measurement, while the Minneapolis Scale scores are based on the quartile deviation as the unit of measurement.

These data point out quite definitely that the equated scales and the informal tests do not measure the same thing. The Van Wagenen and Minneapolis Scales are random-samplings from a large area with no specific reference to a definite spelling curriculum. Because of the superiority of the gain on these tests of the group which emphasized the broader features of spelling instruction, it is evident that the standardized scales measure the wider and more general aspects of spelling power and spelling consciousness. The Jefferson tests are random-sampling tests with specific reference to a definite spelling curriculum. Because of the superiority of the gain on these tests of the control group for which emphasis was held to the narrow confines of the conventional spelling instruction, the assumption that the informal tests are measurements of but a limited part of spelling ability as compared with the equated scales appears warranted. Informal tests may indicate the immediate effects of study upon the material studied by their questionable validity as indications of amounts of change in spelling ability.

SUMMARY AND CONCLUSION

1. This study is one of an evaluation of comparative findings in determining the effects of marks as incentives to pupil growth in spelling ability and of the merits of equated scales and informal tests as measurements of the growth. The data presented appear to have the distinction of being both statistically significant and socially important.

2. The data indicate that an emphasis on the social value of correct spelling and the learning to spell for the resulting self-satisfaction of such accomplishment consistently strengthens the learning bond to a greater degree than the conventional method.

3. The results infer that standardization must play the same role in classroom achievement testing as it has played in mental testing and in the various phases of applied science. It appears evident from the data that informal classroom tests are of doubtful validity as measures of spelling ability in that the mean and mid raw scores consistently show lack of conformity to the similar equated scores.

4. What are the effects of "conventional marks" and "social motives" as incentives to the growth of rapid learners and slow learners in spelling ability? What are the merits of equated scales and informal teacher-made tests as measurements of pupil progress in other subject fields? These questions suggest pertinent problems for further study. The findings of the present study are also suggestive for further research on the teaching values of marks as incentives to pupil growth.

TWO METHODS OF TEACHING HIGH SCHOOL ALGEBRA
Answer to "A Criticism"

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IN criticising the experiment carried out at the University of Minnesota High School, summarized in this journal in September, 1935, it is quite evident that Mr. Washburne[1] did not realize that the article was written in a condensed form. Much of the detailed material, such as a survey of the literature which in the original included a bibliography of 44 items, was omitted in order to conserve on space. This accounts for the fact that none of the "footnote references is to any book or article on individual instruction," and that there is no mention of "any other experiments that have been done along this line." Mr. Washburne mentions Dr. C. N. Stokes who did considerable work in individual instruction in ninth grade algebra at the University of Minnesota High School.[2] It was the writer's fortunate experience to work under the supervision of Dr. Stokes at the University High School, while he was conducting his experiment, and to get first hand information as to his philosophy of individual instruction. Some of his procedures were adapted by the writer to the method of individual instruction used in the experiment in question.

Mr. Washburne's main objection lies in the use of the term "individual method" to characterize the instruction in the experimental group. It is very true that the terminology in the field of methods is confused, and unstandardized. Billet[3] collaborating with Koos in the National Survey of Secondary Education, after a careful comparison of practices in several hundred schools, comes to this conclusion. "In practice differentiated assignments, long-unit assignments, individualized instruction, the contract plan, the laboratory plan, the problem method, and the project method are one and the same thing." From this it follows that a quibble about definitions is as fruitless as it is unscientific. An investigator must carefully describe the procedures to be compared, attaching to each, for the sake of economy in future reference, a descriptive term that is in accord with common usage, as was done in the present experiment. The

[1] Washburne, Carleton. "Two Methods of Teaching High School Algebra: A Criticism," *Journal of Educational Research*, XXX (May, 1937), 680-683.

[2] Stokes, C. N. *Instruction in Ninth Grade Mathematics*, New York: Holt & Co., 1931.

[3] Billet, R. O. "Provisions for Individual Differences, Marking and Promotion," *U. S. Bureau of Ed. Bulletin*, No. 17 (Washington, D. C., 1932), pp. 330.

outcomes of the experiment have implications only for the particular procedures compared, and not for other procedures that might conceivably be similarly labeled. So long as he observes these requirements the experimenter is within his rights in comparing any methods, techniques, or procedures that may attract his interest.

Mr. Washburne, however, severely criticizes the program of individual instruction used in the experimental group, and described an ideal method that, he insists, should have been used instead. He does not state where this program may be found in actual practice. A brief consideration shows, strangely enough, that the program of instruction used with the experimental group approaches more nearly to Mr. Washburne's ideal method than to the "man of straw," "the antithesis of individual instruction" which he describes and, apparently, believes was used in the experiment. A few comparisons will make this clear.

Mr. Washburne cites four main principles. First, "the necessity of self instructive text material, especially prepared for individual work." In meeting the requirements of this principle, Stone[4] states in the preface of the text used, "the organization of the work permits equally of the group or the individual plan of teaching. On account of the simple presentation of each new step, a pupil may work through each unit without much help and at his own rate and be tested on the unit whenever it is completed." While the material may not be the best conceivable, it at least was the intention of the authors to so organize the text that it would be well suited to an individual method of instruction and this text was selected with that in mind.

The second principle set up is "a system of diagnostic testing with remedial work." In the description of the individual method employed in the experiment it will be noted that the students were given a practice test which was designed for diagnostic purposes. This was followed by remedial work as indicated. Then followed a second form of the practice test, which was succeeded in turn by individual remedial help—the teacher sitting down with the pupil, pointing out his errors, and showing him the correct procedures. The remaining part of the class period was used by the teacher in aiding the pupils individually with difficulties they had encountered in the new material.

The third point he makes is that "any informed teacher using the individual instruction, plans the child's assignments with considerable

[4] Stone, J. C. *First Year Algebra.* (New York: Sanborn and Co., 1932), pp. IV-V.

care—usually done at regular intervals in consultation with the child and with consideration of the child's ability and stage of development." In the method used there were definite units or goals set up, the minimum essentials were pointed out to the students, and, as stated above, they were given a practice test followed by suggested remedial problems when necessary. True the practice material was not graded, nor was it in the individual method employed by Dr. Stokes which Mr. Washburne appears to favor as a desirable technique.

The fourth and final criterion which he sets up is that there should be a "careful testing of every child in the individual method group as to his mental age and as to his mastery of the prerequisite foundations and mathematical abilities and concepts." People who are familiar with the program of personnel work at the University of Minnesota High School will agree that students entering the ninth grade or any grade for that matter, are better tested for mental age, achievement, and readiness for work in that grade level, than are the vast majority of other children of the same grade level.

On the basis of the above statements it would seem doubtful if any open minded, unbiased critic, would assert that the technique employed in the experiment was one in which there was "little or no teaching" and "no assignments," that the "youngsters simply plunged into the book to work things out by themselves," that "an ordinary textbook" was used, and that it was a "man of straw." On the contrary such a critic would unquestionably realize that this technique approaches more nearly the ideal as set up by Mr. Washburne, himself.

EDITORIAL

HOW EFFECT THE QUALITY OF EDUCATION

Great educators direct their effort toward that training which the growing mind of the child needs at the time for its nurtured development. Only as present needs depend directly upon the effect of past experiences to extend a growing quality in human life, are the immediate needs related to past learning. These statements are concerned with the nurture of opening powers of the mind and do not contradict the values of training for skill or for a store of knowledge facts, except so far as such training may be imposed before or without the nurture of abilities to use it.

This union of nurture for the child's growing development of native powers, combined with school training for knowledge and skill, is a process which involves the pupils, the school situation, and the teacher in the actual activities of all. A change in one element, however good in itself, involves changes in all the conditions. This interlocking situation is to be studied as a unit to discover when teaching succeeds.

A measurement of this unit as a complex situation is essential as a means by which to determine the quality of instruction. It may be that only a measurement of the conditions set up for the quality elements used in the experiences which develop a mutual interest and understanding of fellowship relations can be made in a definite way. This, however, will guide in the use of the needed experiences of pupils through which to develop the abilities to appreciate companionship relations as these are required in self-direction for mutual satisfactions.

Great teachers have used appropriate literature to meet this need of growing humanity. In this connection, the following report of a teacher at work under most meager conditions is a striking example. I have called it "Fellowship Education." The measurement needs are suggested in the last paragraph.

Some years ago I traveled far just to visit a teacher whose school had been reported to me as unusual. It was a raw March morning when, after a night's travel, I found my way alone and unannounced or expected to the outskirts of a river town and a shabby little two-roomed schoolhouse. It was near a small factory employing unskilled workers, many of whom came from the poorer hill country of Kentucky.

Here I found a young man teaching a room full of overgrown, slow-minded and woefully bedraggled children doing about fifth or sixth grade work. His teaching of reading had been commended to me and I was searching him out to see for myself what he did and the results with the children. When I came into the room he was doing very good teaching of arithmetic. It was mostly oral and with the school as a whole, all the pupils considering the same example. I soon noticed that there were several reasons for his way of doing which were not part of any method he might have for teaching arithmetic. The first condition affecting his work that I noticed was the heating stove. It was unjacketed and at about the middle on one side of the room. As it was yet early in the day the stove was too hot for the comfort of those whose seats were near it, and they had crowded two to a seat with more favorably located classmates. It was quite necessary that the teacher make himself the center of interest in the arithmetic work.

When I happened to change my position and to see the wall at the front of the room with its blackboard extending the entire width I received a startling but very agreeable change of attention. It was like catching a glimpse through a window or in a picture of a new and beautiful though naturally humble and homelike scene. There before me I saw in verse after verse across the whole space and written in clear, firm letters most charmingly neat, and legible across the entire room Whittier's poem, "Still sits the schoolhouse by the road, a ragged beggar sunning;" All of it was there except the last two verses, but including the scene, "Long years ago — the tangled golden curls, and brown eyes full of grieving, of one who still her steps delayed — for near her stood the little boy — his cap pulled low upon his face where pride and shame were mingled" and finally there was the picture, almost in motion and audible, "He saw her lift her eyes — and heard the tremble of her voice, as if a fault confessing.

'I'm sorry that I spelt the word;
I hate to go above you,
Because,'—the brown eyes lower fell—
'Because, you see, I love you.' "

I remembered the last two stanzas which were not in evidence before me—"To a gray-haired man that sweet child-face is showing—He lives to learn, in life's hard school, how few who pass above him lament their triumph and his loss, like her,—because they love him."

Here was evidence of what I had come so far to see. And now the teacher was ready. With no preliminaries he asked an unkempt and lanky lad much too tall for his low desk seat to read the first two stanzas.

The boy drew his length out of the seat slouchingly. He had no coat but wore a dark woolen shirt. His trousers sagged on one side. The bottom of one was tucked above his shoe top and the other was ragged and muddy. I was surprised to see him shuffle to the front of the room and face the school with his back to the blackboard where the verses were written. There were no books or printed copies of the poem in the hands of the children.

Before the class this backward boy seemed to draw himself together and to become one who had memories and sorrows, and also some achievements,—and love. He read out of his new being as though composing the verses to express the images in his own mind. There was not the slightest hint of a trained performance. It was

(Continued on page 696)

REVIEWS

Address all communications relative to book reviews to Editor Kai Jensen, University of Wisconsin, Madison, Wisconsin.

HARRIS, PICKENS E. *The Curriculum and Cultural Change* (New York: D. Appleton-Century Company, 1937), pp. xx + 502. $2.75.

Curriculum workers are not unaccustomed to critical estimates of their efforts but within the reviewer's knowledge never has there been presented a more sweeping and all inclusive condemnation of efforts at curriculum improvement than is leveled by Professor Harris in *The Curriculum and Cultural Change*. The major premise of this book is that "hasty practicality" is the dominant characteristic of curriculum work and that "the larger curriculum problem" has been "obscured by pressure for results." "The whole question of a curriculum theory," the author states, "according to a prevalent attitude, is thus simply agreeing upon definitions." He further states: "Because of the apparent notion that we may substitute a rigorous, practical program of curriculum revision for one that is illuminated by theory, and because it is probably not generally recognized that *theory is merely an effort to interpret practice itself*, there is no generally recognized need for attention to the larger social and psychological issues of curriculum making."

Consonant with this view of curriculum work a large part of the book is devoted to criticism of various practices in curriculum programs and to elucidation of the theory underlying this criticism. A limited amount of consideration is given to the presentation of an approach to curriculum development which the author considers sound. The progress of the book is suggested by its main divisions. Part One analyzes the present situation in curriculum development, emphasizing that there is a general disregard for fundamental considerations in curriculum work; Part Two considers the social process and the curriculum, concluding that the curriculum must serve an emergent idealism, operating within the movement of social forces; Part Three deals with the learning process and the curriculum, emphasizing the dependence of concepts of objectives and method on the nature of learning; Part Four with the organizing principle of the curriculum in which subjects and activities receive special consideration; and Part Five turns attention to the more specific problems of curriculum development such as the use of courses of study and methods of producing materials.

The author has obviously set himself a very large task, the successful accomplishment of which would require an exceedingly broad range of knowledge and experience. It is not surprising consequently to find that the quality of the book varies greatly in different sections. The parts of the book which deal with social and psychological theory are well done. Discussions of the influence on education of the shift from an agrarian economy to industrialism, of the learning process, of the scientific method in rela-

tion to the curriculum, and of the nature of children's thinking are presentations which will be of interest to all who are concerned with the curriculum and instruction.

The sections of the book which deal directly with curriculum practices and problems do not, in the judgment of the reviewer, represent a fair and adequate presentation of the work in curriculum programs. The author does not recognize the fact that recent curriculum programs have greatly increased the emphasis given to study of sociological, philosophical, and psychological problems. Professional study programs involving thousands of teachers in a number of states and cities, and the increasing use of social surveys are not mentioned. Overlooked is the general emphasis at the present on exploratory work by teachers in actual teaching situations and the general tendency to free teachers from restrictions which hamper initiative. Ignored is the fact that programs limited in time and centered on the production of courses of study have come during the past decade to be the exception rather than the rule. It is unfortunate that consideration was not given to social analyses such as those being carried forward in Baltimore and Birmingham, to the large number of study guides which turn attention to problems such as the relation of school and society and the psychological basis of instructional organization, to material such as the Survey Work-Book for Community Analysis prepared in the Alabama state program, to the guides for exploratory work by classroom teachers such as A Guide for Curriculum Planning used in the Mississippi program, and to procedures such as those employed in the programs in Pasadena, Santa Barbara, Glencoe, Ann Arbor, Alabama, Kansas, and Michigan. Rather, there is a tendency for all curriculum work to be lumped together by the author, and the book consequently gives an inadequate understanding of current practice in curriculum development.

Consideration of trends in curriculum development and of the work and theoretical positions of various leaders, while not as inadequate as the foregoing, still leaves much to be desired. In only a few curriculum programs during the past decade has major consideration been given to various "approaches to curriculum making," i. e., frontier thinkers approach, educational shortages, approach, etc., with the idea that a specific approach should be selected for use. Yet the impression is given that this is the common practice and a major source of confusion in curriculum work. Similarly other characteristics of earlier phases of curriculum work are ascribed to the current movement. At one point "the most notable recent example" is a controversy in 1925.

At some points the interpretation does not show a very clear understanding of the position of certain workers on the curriculum. For example, Hopkins is quoted to illustrate the "tendency to obtain immediate objectives by mutilating general objectives." Yet it is well known that although this is a procedure to which Hopkins subscribed in the early stages of his curriculum work, he has modified his position since that time in line with newer developments in psychology and for several years has strongly opposed this procedure.

The negative emphasis of the book tends to make the curriculum worker impatient to secure some constructive suggestions, a contribution which is promised by the purpose of the book. Yet the end is reached with almost nothing of a constructive nature presented. The author apparently sensed this himself for in the last chapter he states: "The reader may protest that we have in all of the fore-

going failed to give any true conception of our own procedure in curriculum development. It may be insisted that the author has been critical along many lines but has nowhere really pictured, even in broad outline, his own plan or method of attack. The question may still remain, therefore: "How shall we proceed?" Hope that the remaining emphasis may be positive is soon dashed for after two paragraphs of questions and three paragraphs which set the stage for a constructive emphasis the heading is encountered. "How the Demand for Efficiency Interferes" and the discussion is back where it started.

It is a safe prediction that the reception of the book will vary as greatly as does the quality of its various sections. Those who are primarily concerned with educational theory and those who believe in organization of the curriculum "on the spot" in terms of the immediate interests of children probably will be favorable to the treatment. On the other hand, those who are responsible for the organization and direction of curriculum work in city and state programs and those who believe that the curriculum should be planned in advance, at least to a degree, will feel that the book is overly critical without adequate basis and without offering complementary constructive suggestions.

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RUCH, FLOYD L. *Psychology and Life* (New York: Scott Foresman and Company, 1937), vix + 679. $2.75.

The psychologist who long ago taught the business man to study consumer demand rather than combat sales resistance has at last applied this principle to his own product. The contents of *Psychology and Life* were determined by a market study in which the topics of elementary psychology were appraised by three interested groups. In this study one thousand college students rated their degree of interest in each of 122 topics commonly treated in elementary psychology; graduates of ten years before rated the topics in respect to the utility of the information in their later life, and college teachers and administrators appraised the social value of the information contained in a sampling of the same topics.

Of the 122 topics those of greatest interest to the student centered around the understanding and improvement of personality, motivation, the training of children, the technique of reasoning in everyday life, heredity vs. environment, crime and delinquency, mental disorder, and effective study.

From a study of the returns to his questionnaires Ruch concluded ". . . that subject matter which meets the *interests* of the student also meets the *needs* equally well." As Ruch points out, this happy coincidence of need and interest greatly simplifies the task of preparing ". . . a textbook of elementary psychology written under a vow of loyalty to the student as a certain member and possible leader of society."

An examination of the book will show the author true to his principles. Part 1, Psychology and People (147 pages) discusses the subject matter of psychology, the nature and origin of individual differences, personality and its measurement, and intelligence. Part 2, the Background of Behavior (214 pages) covers emotions and their development, motivation, the control of personal-social behavior, and problems of adjustment. Part 3 Psychological Problems (79 pages) has among its section headings; choosing your work, getting along with people, marriage, some problems of family life, psychology and war, psychology and industrial unrest,

psychology and education. Part 4, Observing, Learning and Thinking (209 pages) touches in an unconventional way the more conventional topics of an elementary test.

Psychology and Life is a success in that the author accomplishes what he has set out to do. Students read it with interest, discuss its problems with avidity, and achieve a considerable reconstruction of their views. The book really gets under their skins.

The psychologist who finds *Psychology and Life* superficial, anecdotal, verbose, and painfully explicit must remind himself that this book was not written for him but for a twenty-year old sophomore who knows nothing of scientific method, has probably never engaged in ten consecutive seconds of clear thinking, whose mind is a haggis of superstition, and who is ignorant of the meaning of such words as *impetus*, *agnostic*, and *naif*. Ruch is not laboriously explicit to the typical sophomore.

Experience in using *Psychology and Life* as a text does bring out certain real difficulties. The prose flows along so easily that students tend to read superficially and uncritically. The remedy of the reviewer has been to prepare study questions forcing a rigorous and critical study. As was inevitable, there are lapses from the student-centered point of view, the psychologist occasionally writes for psychologists. As might be expected from the unsettled nature of the field which it covers, *Psychology and Life* contains an usually large proportion of statements with which many psychologists will disagree. In the reviewer's experience these controversial statements are no defect in the text as a teaching device.

The outstanding deficiency of *Psychology and Life* lies in relative neglect of the topic of learning. The two chapters on learning, placed almost at the very end of the book, tell the student practically nothing about the way in which we change as a result of experience. Yet a student who has no insight into the nature of learning can scarcely read profitably the chapters on motivation, personality, and self improvement which form the bulk of the book.

The reviewer believes that a good case can be made out against the market survey method of selecting topics for a text in psychology. He is inclined to believe that the coincidence of need and interest discovered by Ruch's questionnaire study is an accident of the phrasing of the questions. But with Ruch's thesis, that a book should be written for those who are to read it, he is in complete agreement. He finds himself hoping that other psychologists will subscribe to this obvious though revolutionary thesis. Rather more than with most subjects, psychology courses have been dominated by narrow professional interests to the neglect of the student. Professor Ruch has broken into new and rich country which the psychologists have hitherto walled away from beginners.

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RICHMOND, WINIFRED V. *Personality: Its Development and Hygiene* (New York: Farrar and Rinehart, 1937), pp. xvii + 279. $2.00.

PLANT, JAMES S. *Personality and the Cultural Pattern* (New York: The Commonwealth Fund, 1937), pp. x + 432. $2.50.

TERMAN, LEWIS M., MILES, CATHERINE COX and OTHERS. *Sex and Personality: Studies in Masculinity and Femininity* (New York: McGraw-Hill Book Company, 1936), pp. xi + 600. $4.50.

Miss Richmond has added another to her list of well-written but all-too-brief

books dealing with problems of personality. In the present volume she covers material ranging from the historical perspectives on personality and the methods of analyzing it through five chapters dealing with such fundamentals as soma, intelligence, emotion, organization of energy, and habit, to four excellent chapters on major and minor forms of personality maladjustment. While her description of cases and her advice is, on the whole, sound, nevertheless the author has a strong predilection to lay what seems to the reviewer to be undue stress on hereditary factors. Unfortunately she lacks a clear and systematic orientation regarding the role of society and culture in influencing and molding the individual's development. Yet the concrete discussion of cases is admirable and the book will provide any reader a rapid and interesting survey of the field.

In spite of Dr. Plant's alleged recognition of the effects of culture and society upon the attitudes and habits of the developing individual, his book bears the traditional badge of his profession in defining personality as essentially something inherent which is given over at birth to a set of other forces called "environment." Yet in his specific discussion he inconsistently makes a strong case for the improvement of personality through modification of the environment. The volume is based upon the author's fourteen years' service as psychiatrist in the Juvenile Clinic of Essex County, New Jersey. The generalizations—and there are many—represent Dr. Plant's interpretation of his clinical practice, but unfortunately there is little or no concrete case analysis to indicate the foundations of these generalizations.

The first section of the book reviews the changing concepts of personality, presents the writer's physiological analogy of the relation of the personality and environment as "psycho-osmosis," and delimits the sources of his material as arising in the "casual breakdown," that is, in minor disturbances in the balance between personality and culture. The second section opens with a detailed treatment of personality "structure," both inherent and acquired. This is followed by a lengthy chapter on the "pressures of the environment" upon the individual, particularly the social-cultural factors which generate emotional conflicts. Two chapters are devoted to discussing the deleterious influences of the modern family upon the personality growth of children and to indicating how present-day urban culture adds further burdens by inducing periodic poverty, by neglecting to provide adequate and wholesome outlets for play impulses, and by undermining opportunities to develop self-sufficiency.

Part Three, "Toward an Individual-Centered Culture," opens with a plea for a cultural scheme which will recognize the inviolability and social importance of individualism. The author warns us of the dangers lurking in any culture which tends to submerge the person to the collective aims. Reiterating his criticism of the family, he goes on to emphasize the central obligation of the school "to educate the child away from the psychological implications of family life" (p. 293). Next in importance to formal schooling is provision for sound recreation. And in setting free the growing boy or girl from the ancient bonds of fear, undue authority, parental projection, and the like, such agencies as the Juvenile Court are faced with the dilemma of insisting upon conformity or punishment, and recognition of the need for prevention of delinquency, or at second best, upon some system of treatment which will turn the person back into the stream of societal adequacy before it is too late. It is in this connection that social work, psychiatry, and mental

hygiene will become increasingly significant. The psychiatrist, in particular, is envisaged more as an agent for adult education in matters of child rearing than as a diagnostician concerned with curing young people who have strayed from the approved pathways of society. And while organized religion has great potentialities for aiding in this task, the author indicates in plain language its rather complete failure to meet the challenges. There is a short chapter on the effects of mechanized industry upon the individual. In the final chapter the author repeats his defense of an "individual-centered culture" especially in terms of important goals for the growing child. These must include training him to live day by day as realistically and as courageously as he can, to develop independence and ability to distinguish between symbols and actualities.

I wish this book were better written. Unfortunately it is filled with a jargon peculiar to social workers, especially with the bad practice of making nouns and even verbs into adjectives. It abounds in such phrases as: "earlier-laid-down patterns" (p. 15), "hunch material" (pp. 58, 62, 108, 164, 381), "ponderous abstractions of worded researches" (p. 167), "less-advantaged area" (p. 207), "lack of goal images" (p. 216), "great importance of meeting the belongingness needs of people" (p. 257), and "member-role" (p. 366). But in spite of an awkward style and its inadequacies on the side of concrete materials, this book marks a distinct step forward in the rapprochement of psychiatry and cultural anthropology.

Terman and his collaborators have made an invaluable contribution to a long-neglected topic: the masculine and feminine components of personality, what they are, and how they may be measured. Upon basic biological differences of sex are built up important divergences in ideas, attitudes, and habits—in short, important aspects of the role of the person in his society. That is, masculinity or femininity, as they are expressed in everyday life, represent the profound effects of cultural and social conditioning. The data provide no end of evidence for this, especially in regard to parental influences. Moreover, the force of the cultural norms is indicated in the demonstration that "less aggressively inclined males will be driven to absurd compensations for their femininity" (p. 452), that masculine women will be at a disadvantage in the marriage market, and that competition of the sexes will continue to affect politics, industry, and home life.

Yet the authors are cautious not to commit themselves to a strictly environmental thesis. In spite of culture, fundamental physiological substrata to the role of the sexes cannot be gainsaid. And in the face of their statistical evidence, they conclude that the influence of nurture on these differences "is by no means crucial." In this connection the reviewer is disappointed that the authors did not stress the additional highly important factor of bisexuality. We know from anatomy and endocrinology that the two sexes do not fall, even at these levels of scientific description and analysis, into two strictly dichotomous series. Moreover there is much evidence that men and women are not only biologically but also psychologically predisposed to bisexuality. On this latter point the Freudian analysis provides ample data, just as does Terman's, especially on sexual inversion, a special test for which was developed in the course of the investigation.

Regarding the tests of masculinity and femininity, the writers are duly cautious, recognizing their tentative nature. Furthermore they make the excellent suggestion that statistical considerations of

the data, to be made most significant for science, must be followed up by more and more detained clinical and case studies of the "deviant-scoring subjects" themselves. The reviewer regrets that the case materials are so sketchy.

The book is well-written and should not only furnish a stimulus to further research, but for psychiatrists, educators, social scientists, and laymen, it should prove a valuable body of material on this long-ignored field of personality study.

KIMBALL YOUNG
University of Wisconsin

AKRIDGE, GARTH H. *Pupil Progress Policies and Practices.* Contributions to Education, No. 691 (New York: Bureau of Publications, Teachers College, Columbia University, 1937), pp. viii + 76. $1.60.

Dr. Akridge has employed the statistical technique to discover the effect of retardation and acceleration on homogeneity in a given school grade. After briefly reviewing related studies having to do with pupil classification, and making a careful set of definitions of terms used in his own study, he has explained his use of data gathered from a study of 1,175 pupils either in the fourth grade or who were of normal chronological age or of normal progress for that grade.

A battery of standardized group tests, consisting of a mental test and six achievement tests, was administered to the 1,175 pupils during a period of approximately two months. The complete battery of seven tests was given to each of the 1,175 pupils included in the study, thereby making available for use a total of 8,225 test scores.

The results of the study suggests that a very large proportion of the cases of retardation and acceleration as well as those of underageness and overageness might have been prevented without injury to the pupils concerned, or to the homogeneity of the instructional unit. Indeed, Dr. Garth concludes that regular progress through the grades, with neither retardation nor acceleration tends to maintain an optimum school organization at all levels.

JOHN H. JESSUP
University of Washington

CHAPIN, F. STUART, and QUEEN, STUART A. *Research Memorandum on Social Work in the Depression.* Bulletin No. 39 (New York: Social Science Research Council, 1937), pp. xii + 134. $1.00.

National Resources Committee. *Technological Trends and National Policy: Including the Social Implications of New Inventions.* House Document No. 360 (Washington: Government Printing Office, 1937), pp. x + 388. $1.00.

These two volumes may be grouped appropriately for brief review because of their emphasis on the broader social aspects of science and scientific method rather than on the mechanics of conducting and reporting research.

Chapin and Queen's monograph is one of thirteen prepared under the direction of the Committee on Studies in Social Aspects of the Depression. The other twelve volumes deal with as many topics in relation to the depression: crime, education, the family, internal migration, minority peoples, reading habits, recreation, religion, rural life, social aspects of consumption, social aspects of health, and social aspects of relief policies. (The monograph on education deals with problems in the various subdivisions of the field.)

The Chapin and Queen volume covers the topics of social case work: family welfare, child welfare, medical social work, and psychiatric social work; social group

work: social centers and national "program" agencies; institutional care: children, and the aged and infirm; social planning and program promotion: local councils and chests, national "network" agencies, national agencies with specific programs, agencies serving ethnic or religious groups, and social planning by government; progressional status: education and training for social work, and professional associations; and the possibilities of scientific research in this field.

There are three major obstacles to research in the field of social work: (1) attitudes of opposition to trying something new, (2) incomplete records that permit only partial factual comparisons of services over a period of time or of different services as between agencies, and (3) unfamiliarity with the scientific techniques of social experimentation. Although the same logic and method are applied in social research as in natural science, the difficulty of controlling the variables in experiments with social groups is great. Some progress has been made in the construction of scales to measure social attitudes, character traits, personality, group participation, and social status.

The monographs on technological trends, by the National Resources Committee, explains in a large measure the underlying causes of the social maladjustments discussed in the Chapin and Queen volume and in the other twelve monographs of the Social Science Research Council. Invention is characterized as the greatest general cause of change in modern civilization, although social forces in turn may encourage or discourage inventions. While lack of precise knowledge concerning the effect of inventions or the present and future is a serious obstacle to adequate social planning, there is usually an average time interval of about thirty years between the origins of an invention and its social effects, a sufficient period in which to make social adjustments under wise leadership. Part I deals with the social aspects of technology: national policy and technology, prediction of inventions, social effects of inventions, resistance to the adoption of technological innovations, and unemployment and increasing productivity. Part II is concerned with the relation of science and technology. Part III discusses technology in the fields of: agriculture, mineral industries, transportation, communication, power, chemical industries, electrical goods industries, metallurgy, and construction industries.

CARTER V. GOOD
University of Cincinnati

HARRISON, MARGARET. *Radio in the Classroom: Objectives, Principles, and Practices* (New York: Prentice-Hall, Inc., 1937), pp. xvi + 260. $2.50.

Perhaps no new invention and its subsequent development have had a more far-reaching effect than the radio. Before we were aware of what was happening, we discovered that there had developed, under our very eyes, one of the most potent educational influences of modern times. With unusual rapidity receiving sets have been installed in classrooms, and teachers have been struggling with the task of fitting this new instrument into the curriculum.

Miss Harrison's book is the first presentation of practical assistance to the educator who is anxious to make the best use of radio in the classroom. From a background of wide experience and extensive study of the use of radio in the school, the author has given her evaluation of, and suggestions for, efficient school use of this new instrument.

The book is divided into two parts. Part I deals with Classroom Use, Equipment, and Supervision of radio. The six

chapters in this part discuss (1) Educational Objectives and the School Radio; (2) Radio Programs Available to the School; (3) Selection and Classroom Use of Radio Programs; (4) Classroom Activities Related to Radio; (5) Supervision of the School Radio; (6) Radio Receiving Equipment for the School. In Part II the author discusses radio's contribution to the activity program and the development of the units of classroom work. In this discussion the author assumes a progressive education point of view in presenting in considerable detail four units of activity and how the radio contributed to their development.

The author has successfully blazed a new trail in presenting the best single reference now available for teachers, supervisors, and administrators interested in school use of radio. The six page bibliography helps to make the book of great value as a text or reference for use in teacher training courses.

L. H. MATTHEWS
University of Wisconsin

HOW EFFECT THE QUALITY OF EDUCATION

(Continued from page 687)

the boy's expression of an experience, real to him as his daily life, and yet totally unlike his usual thoughts. The responses in him to a common humanity, regardless of his narrow, sordid, and dull living, seemed to feel and express the beauty and the deeper meanings lurking in common things. There was not the suspicion of a possible mistake in the words to be used. The verses had not been learned by rote, they had been absorbed as though his very being bathed in them as they appeared there before him for several days during school hours and were carried in his mind without conscious effort at other times. The result was that of constructive feeling and of the informing attitudes of purpose and of attainment rather than of what we call an intellectual effort.

The entire class read in the same way. There could be no question of measuring their rate of reading or of testing their comprehension by a correct underlining of the right word. The words flowed or eddied as thoughts and feeling and purpose required. Only by the total rendering in tone, word, and every slightest inflection was meaning to be followed; and each successive reader rendered not one meaning but each his own response to an experience shared with the author.

And then came the unveiling of the last two stanzas for they were there written on the board, only a wall map had hung over them. Here was a changed picture. "Still memory to a gray-haired man that sweet child-face is showing." This action is not to be seen out in the open but requires introspection. At first the impression seemed hard and forbidding. The teacher told a story or two. One of the rude awakening of the boy Lincoln to the injustice of slavery and to the call for service from those who feel for their fellows. Soon some of the class were reading those verses to express, not the mere memories of a gray-haired man, but rather the purpose of a young man to pass, whether above or below, but always with helpfulness and kindness for the other fellow.

Fellowship education—yes, but it is qualitative in its methods rather than quantitative. It transforms feeling, attitudes, and purposes by glimpses of genuine humanity. And yet its ingredients must be truly balanced quantitatively. An excess of emotion, or an over-emphasis of duty, or an over-crowding of incidents is fatal. The teacher doing these things successfully is worth going miles to see.

GEORGE A. BROWN

RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

Annual List of Research Activities of the Members of the Ohio Education Association, Mary D. Barnes and Others. "Fit to Teach," *Ninth Yearbook* of the Department of Classroom Teachers of the National Education Association of the United States (Washington: National Education Association, 1938), xi + 276 pp.

This bulletin contains chapters as follows: Introduction, Are Teachers Healthy?, The Personal Health Practices of Teachers, The Mental Health of Teachers, Spiritual Health, The School Environment and The Health of Teachers, The Teachers' Health as Affected by Factors Outside the School, Community Responsibility in the Promotion of Teacher Health, Health Promotion by Teachers' Professional Organizations, Pre-Service Training of Teachers, and Entering the Profession With Good Health.

CALIVER, AMBROSE, and GREENE, ETHEL G. *Education of Negroes: A five year bibliography 1931-1935.* Bulletin, 1937, No. 8, United States Department of the Interior, Office of Education (Washington: United States Government Printing Office, 1937), vi + 63 pp.

An annotated bibliography on all the more important phases of negro education.

CHAMBERS, M. M., and OTHERS. *The Sixth Yearbook of School Law* (Washington: American Council on Education, 1938), viii + 150 pp.

A summary of recent legal decisions relative to the rights of pupils and parents; teacher certification, appointment and dismissal; teacher tenure, retirement, etc.; school contracts and other related topics.

DEARBORN, WALTER F., and ROTHNEY, JOHN W. M. *Scholastic, Economic, and Social Backgrounds of Unemployed Youth,* Harvard Bulletins in Education, No. 20 (Cambridge: Harvard University Press, 1938), xi + 172 pp.

After reviewing previous investigations the authors present the results of a questionnaire study directed to 1,360 young people drawn from the Harvard Growth Study. While there were no statistically significant differences between the employed and unemployed groups in age, mean school works, occupational training and a large number of qualities of this sort, significant differences were found in ethnic origin, methods of securing employment work for pay in school and the amount of training beyond the high school.

HAMILTON, CHARLES W., and OTHERS. *Guidance Service Standards for Secondary Schools* (New Jersey Secondary School Teachers' Association, 1937), x + 50 pp.

This bulletin contains a discussion of the aims and principles of guidance, definition of terms; minimum essentials of counselling, placement, and follow-up; guidance service standards; organizing and administering guidance programs, and certification standards for guidance workers. Bibliography.

JOHNSON, ANNA ROSELL. *Standards of Relief: An Analysis of One Hundred Family Case Records* (Philadelphia: University of Pennsylvania, 1938), x + 153 pp.

A report of a detailed study and analysis of 100 cases of allowance families under care of the associated charities, now the Family Service Association of Washington, D. C.

KNUDSEN, CHARLES W., and OTHERS. "Psychology and Methods in the High School and College," *Review of Educational Research*, VIII (February, 1938), pp. 1-102.

Contains summary of research in art, character education, commercial subjects, education and psychology, English language, reading, literature, and the other school subjects.

Proceedings of the Fourteenth Annual Educational Conference and the Third Annual Meeting of the Kentucky Association of Colleges and Secondary Schools. Bulletin of the Bureau of School Service, College of Education, University of Kentucky, (Lexington, Ky.: University of Kentucky, 1937), 198 pp.

A report of papers read at this annual meeting of the School of Education of the University of Kentucky.

REEVES, FLOYD W., and OTHERS. *Report of the Advisory Committee on Education* (Washington: United States Government Printing Office, 1938), xi + 243 pp.

After a survey of the present educational situation of the committee presents a recommended program of national education discussing opportunity in the public schools, education and adjustment of youth, educational services for adults, library service for rural areas, higher education, vocational rehabilitation and many other related topics.

SMITH, HENRY LESTER, and EATON, MERRILL THOMAS. *Two Studies in Education; The Relation of Accuracy to Speed in Addition and a Study of Bilateral Transfer.* Bulletin of the School of Education, Indiana University (Bloomington, Indiana: Bureau of Coöperative Research, Indiana University, 1938), 42 pp.

A report of two research studies in the field of learning.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

BAKER, HARRY L. "High-School Teachers' Knowledge of Their Pupils," *School Review*, XLVI (March, 1938), pp. 174-190.

From data collected from teachers and pupils the author concluded that teachers know less than a fourth of the facts about their pupils and some teachers know their pupils much better than others.

PSYCHOLOGY OF LEARNING AND TEACHING

DOUGLASS, HARL R., and BAUER, HAROLD C. "The Study Practices of Three Hundred Ninety-five High School Pupils," *The Journal of Educational Psychology* (January, 1938), pp. 36-43.

Pupils of above average intelligence made a practice of skimming over material before reading in detail; a slightly superior mark seems to go with "studying

for a class just before it begins"; the practice of looking up words in the dictionary is positively associated with better grades. Other practices enumerated by the authors seem to be associated with better grades and higher levels of intelligence.

GROSSNICKLE, FOSTER E. "The Effectiveness of Checking Subtraction by Addition," *The Elementary School Journal*, XXXVIII (February, 1938), pp. 436-441.

Seven groups of third-grade pupils were taught compound subtraction for a period of about twelve weeks. Each practice example was checked by addition. The results seem to show that the checking does not increase accuracy.

HAZLETT, J. ROY. "An Experimental Study of Methodology in Presenting Geographic Material by Motion Pictures," *Pittsburg Schools*, XII (January-February, 1938), pp. 128-137.

From a study of classes in 5B geography in nine Pittsburg Public Schools the author found a statistically significant difference in favor of classes using visual aids.

KIRKENDALL, LESTER A. "The Influence of Certain Incentives in the Motivation of Children," *The Elementary School Journal*, XXXVIII (February, 1938), 417-424.

Through the use of a questionnaire given to 284 pupils in Grades IV, V, and VI in the New Britain, Connecticut, Public Schools the author derives a list of incentives and their relative motivating influence.

MANWILLER, C. E. "Reading Difficulties," *Pittsburg Schools*, XII (January-February, 1938), pp. 97-123.

Part II of a detailed study of reading difficulty with suggestions for remedial measures.

CURRICULUM

BROWNELL, WILLIAM A. "A Critique of the Committee of Seven's Investigations on the Grade Placement of Arithmetic Topics," *The Elementary School Journal*, XXXVIII (March, 1938), pp. 495-508.

The author presents a critical review of the committee of Seven's report and concludes that the standards proposed are of doubtful validity.

FITZGERALD, JAMES A. "The Vocabulary and Spelling Errors of Third-Grade Children's Life-letters," *The Elementary School Journal*, XXXVIII (March, 1938), pp. 518-527.

From an analysis of 1,256 letters written by third-grade children in 27 states from New York to California to another supplies a new frequency list with frequency of care and errors of spelling.

WILSON, FRANK T., FLEMMING, CECILE WHITE, BURKE, AGNES, and GARRISON, CHARLOTTE G. "Reading Progress in Kindergarten and Primary Grades," *The Elementary School Journal* XXXVIII (February, 1938), pp. 442-449.

The authors report the results of a study of reading readiness made in the kindergarten and primary grades in the Horace Mann School. It seems possible that some teachers underestimate the long and difficult process involved in mastering letter forms and sounds. The authors suggest a number of facts about beginning reading.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Encyclopedia of Educational Research.—Walter S. Monroe of the University of Illinois, with the encouragement of the American Council on Education and other interested educational organizations, has been active in initiating preparation of an encyclopedia of research. Some 175 persons have agreed to contribute their services to the project. It is expected that this large volume will be published toward the end of 1940.

The general character of the project is indicated by the phrase "comprehensive evaluation, synthesis, and interpretation of educational research." An outline of the field of educational research has been developed, which includes about four hundred topics of which approximately one hundred designate major areas of educational research. For each of these topics, it is proposed that: (1) the pertinent research be critically evaluated, (2) the dependable findings be "added up," and (3) this synthesis be interpreted with reference to educational theory and practice. The nature and organization of the contribution on a given topic will necessarily vary with the character and amount of research that has been done, but the following should be included: (1) specification of the particular questions studied, (2) statement of what research has accomplished with reference to these questions, (3) interpretation of the synthesis of findings, (4) discussion of the need for further research and the crucial difficulties which should receive first attention, and (5) a highly selected bibliography. The contributions on the various topics will be arranged alphabetically, together with appropriate cross references to form a convenient reference work of the encyclopedia type.

Dictionary of Education.—Phi Delta Kappa, professional fraternity in education with a membership of some 22,000 men in eighty chapters, is sponsoring preparation of a Dictionary of Education. The primary purpose is to prepare a comprehensive dictionary of technical terms in education which will do for educational workers and teachers what already has been accomplished by technical dictionaries for practitioners in such special fields as medicine, law, engineering, and psychology. The dictionary will promote greater clarity and consistency of usage in educational literature and in classroom instruction. The plan calls for sponsorship by Phi Delta Kappa through a supervising committee, and coöperative participation in the definition of terms by key men in various chapters who will enlist the aid of their associates. The stimulation given to local chapters through coöperative effort should be as valuable to Phi Delta Kappa as is the dictionary itself to the field of education. Best usage and expert opinion will determine the definitions accepted.

The project is concerned with technical and professional terms, concepts, ideas, problems, theories, practices, methods, trends, movements, plans, etc., in the en-

tire area of education. It probably will exclude names of persons, institutions, school systems, and organizations, places, and titles of publications and journals except where a movement, method, or plan is represented, as for example, in general education the Morrison plan, Dalton plan, Herbartianism, etc.

Analysis of major publications and sources in the field of education will provide the technical and professional terms, with the definitions submitted to authorities in the field, possibly requiring agreement on the definition accepted, from two or three experts. The most recent and best usage will be stressed, reflecting current scientific and professional trends, educational theory, research, and practice. Authoritative sources include the textbooks, journals, yearbooks, indexes, reference books, research studies, dictionaries in specialized areas of education, etc.

The committee in charge of the Dictionary of Education is made up of: Carter Alexander, Columbia University; W. W. Charters, Ohio State University; Paul M. Cook, ex-officio, executive secretary, Phi Delta Kappa; H. D. Rinsland, University of Oklahoma; W. Ray Smittle, Wayne University; and Carter V. Good, chairman, University of Cincinnati. The completion of the project probably will require a period of four years.

Yearbooks of the N. E. A. Departments.—The Research Division of the National Education Association assists in the preparation of the yearbooks of three departments: Department of Elementary School Principals, Department of Classroom Teachers, and American Association of School Administrators (formerly Department of Superintendence).

The 1938 Yearbook of the Department of Elementary School Principals is being completed under the title, *Newer Practices in Reading in the Elementary School.* Chapters have been prepared covering the following areas: scope of the reading program, reading readiness, beginning reading, cultivation of appreciation and good taste, study reading in content fields, diagnostic and remedial reading, providing classroom materials, using libraries, school and class organization for better reading, and administering and supervising the reading program. The editorial committee includes: Chairman Maude McBroom, University of Iowa; L. M. Fertsch, Austin, Texas; and Cecilia Galvin, Indianapolis, Indiana. The yearbook will be distributed in September, 1938. Richard R. Foster, assistant director of research, N. E. A. Research Division, is consultant on both the 1938 and 1939 volumes.

The editorial committee of the Department of Elementary School Principals has begun work on the 1939 yearbook dealing with the problem of enriching the curriculum for the elementary school child. Manuscripts have been invited treating such topics as: the nature of curriculum enrichment, enriching content of courses, methods of teaching that vitalize learning, using community resources, measurement and guidance in relation to curriculum enrichment, vitalizing the curriculum under various types of school organization, administrative aspects of enrichment, and research contributions to the problem of enrichment. Those interested in preparing materials for the yearbook are invited to write for a descriptive folder (Editorial Committee, Department of Elementary School Principals, 1201 Sixteenth Street, N. W., Washington, D. C.). The committee for 1939 consists of Chairman L. M. Fertsch, Austin, Texas; Cecelia Galvin, Indianapolis, Indiana; and Jess S. Hudson, Tulsa, Oklahoma. The yearbook will be distributed in September, 1939.

A joint committee of the Department of Classroom Teachers and the American Educational Research Association is preparing a yearbook on the implications of research for the classroom teacher. An attempt is being made to show teachers how the outcomes and implications of research may be turned to the improvement of instruction. Among the teaching areas included in the study are: safety, health, art, home economics, science, social studies, arithmetic, high-school mathematics, reading, handwriting, spelling, English, and foreign languages. Material will also be presented on the topics: aims of education, child development, the learning process, extracurriculum activities, and the organization of classes and schools. One major section of the yearbook will be devoted to general helps for teachers on the interpretation and use of research in the classroom. The Committee consists of Mrs. Myrtle Hooper Dahl (Chairman), Paul T. Rankin, Prudence Cutright, Hilda Maehling, Edna Greene, Robert Clark, Wilbur Raisner, and William S. Gray. According to present plans the yearbook will be available about the time of the winter meeting in 1939. For a previous progress report see the March number of the *Journal*. Ivan A. Booker, assistant director of research, is working with the committee on behalf of the N. E. A. Research Division.

The 1939 yearbook of the American Association of School Administrators *(Problems of the Small School System)* is under the chairmanship of Hobart Corning, superintendent of schools, Colorado Springs, Colorado. The commission includes several competent authorities in university circles as well as administrators in small school systems. Areas of treatment in the volume include: the small community from a sociological angle, the unique opportunities of the small school system, lay and professional leadership, curriculum problems, interpretation of the schools, funding the program, management of expenditures, school plant and equipment, pupil guidance, and the professional status of superintendents in small school systems. The yearbook will be distributed in February, 1939. Research consultative assistance on this and the 1940 volume is being given by Frank W. Hubbard, associate director of research.

In 1940 the yearbook of the superintendents' department will be on the subject of safety education. The chairman of the commission is Henry H. Hill, superintendent of schools, Lexington, Kentucky. Preliminary plans reveal that an effort will be made to call attention to some of the better instructional practices. Activities of non-school groups will be examined critically. Sources of safety aids will be listed. It is hoped that the resulting handbook will increase and improve present school safety activities.

Although the N.E.A. Research Division does not assist with the 1938 yearbook of the Department of Supervisors and Directors of Instruction, the forthcoming report should be noted at this point. Under the chairmanship of S. A. Courtis of the University of Michigan a study is being made of how coöperation is achieved. Three types of material will be included in the final report: the nature of coöperation and its importance in our national life; the nature of actual coöperative activities now being carried on in schools, according to teachers; and descriptions of techniques of coöperation which may be used in education. Inquiries may be addressed to Miss Mary Hazell, secretary of the Department, 1201 Sixteenth Street, N. W., Washington, D. C. For a previous progress report see the April number of the *Journal*.

This information was provided by Frank W. Hubbard.

Advisory Committee on Education.—The report of the President's Advisory Committee on Education recommends grants to public education of $72,000,000 in 1939-40, to be increased to $202,000,000 in 1944-45. The latter sum combined with existing grants would make a total of approximately one-quarter of a billion dollars annually in 1944-45. The report of the Committee is now obtainable from the Superintendent of Documents, Washington, D. C., at thirty-five cents per copy.

Ten principles were adopted for controlling federal aid to public education:

1. The major portion of all federal aid for education should be granted as a general fund for the current support of elementary and secondary education. In order that states and local school jurisdictions may have the necessary flexibility in the development of programs suited to local conditions, the specification of particular phases of elementary and secondary education to be supported from such a fund should be avoided.

2. The major portion of federal aid for education should at all times be granted on a basis that tends to lessen inequalities of opportunity among states and within states.

3. Federal grants for special educational purposes may properly be used to bring about attention to educational matters of special national concern and thus to improve the educational programs conducted under state and local auspices, but such grants should be considered with very great care to see that improvement does in fact result. The states are the units for the organization of educational programs; the methods of making grants should therefore avoid so far as possible the overdevelopment of any one phase of a state program at the expense of other phases.

4. The federal government should record its purposes explicitly but broadly, leaving to the states wide discretion and flexibility in the administration of the federal grants, although those grants should be conditioned upon distribution within states in conformity with the general purposes for which the grants are made.

5. The general principle of coöperation between the federal government and the states, without coercion by either party, should dominate legislation providing for federal grants; but wherever the major purpose of the grants is to bring about progress toward equality of educational opportunity, matching of funds by the states or local communities should not be required. Help is most needed in those areas where matching would be unjust if not impossible.

6. In order that local initiative and responsibility may be maintained, all federal action should reserve explicitly to state and local auspices the general administration of schools, control over the processes of education, and the determination of the best uses of the allotments of federal funds within the types of expenditure for which federal funds may be made available. The federal government should in no case attempt to control the curriculums of the schools or the methods of teaching to be employed in them. In those fields, however, it should carry on research and make the results widely available.

7. All federal grants for educational purposes to states maintaining separate schools and institutions for Negroes should be conditioned upon an equitable distribution of the federal funds between facilities for the two races.

8. Federal grants should be used to build up and strengthen existing educational agencies and institutions insofar as they are able to serve important needs, and not to establish competing agencies and institutions.

9. Any system of federal grants as a whole should be consistent with sound fiscal policy and should facilitate progress in tax reform.

10. In view of the extent of existing federal relationships to state and local conduct of education and their probable increase through the years, federal relations to education should be reviewed under specially constituted and appropriate auspices at intervals of not more than ten years.

Discussion Groups.—A manual for discussion groups under the title of *Talking It Through* has been prepared by the Committee on Planning of the Department of Secondary School Principals of the National Education Association. It is intended particularly (with especial emphasis on the "Issues" and "Functions" of secondary education) for use in the national discussion program which the Department is sponsoring among the 48 states. Walter E. Myer is director of the discussion-group project with headquarters at Washington, D. C.

Rockefeller Foundation.—The annual report states that, during 1937, the Rockefeller Foundation appropriated a total sum in excess of $9,500,000. Of this amount, $2,400,000 was given to the medical sciences, $2,200,000 to public health, $2,000,000 to the social sciences, $1,100,000 to the natural sciences, $800,000 to the humanities, and $400,000 to rural reconstruction in China.

In carrying out its 1937 program the Foundation operated in 52 different countries, from Norway to the Fiji Islands. Twenty-three of these countries were in Europe, 4 in Asia, 3 in Africa, 6 in South America, 11 in North and Central America and the West Indies, and 5 in other parts of the world. Forty-five percent of the money given went to foreign countries, and the remainder, 55 percent, was for work in the United States.

The Foundation's program, in terms of broad objectives, is the advancement of knowledge. Within this general area there are certain specific fields upon which emphasis is at present being placed. The emphasis in the medical sciences is largely psychiatry; in the natural sciences, on experimental biology; in public health, on the development of a trained personnel and on the study and control of certain diseases; in the social sciences, on such basic problems as international relations, social security, and public administration; and in the humanities, on efforts which tend to raise the general cultural level and to promote cultural interchange between countries. These defined objectives are not rigidly interpreted. They serve merely as guiding marks in an effort to give the program a reasonable degree of concentration.

Except to a limited extent in public health, the Foundation is not an operating organization. It conducts no researches of its own. Its activities are confined to the support of other agencies—universities, laboratories, and research institutes—and to the training, through fellowships, of competent personnel in the various fields of knowledge.

Australian Council for Educational Research.—The annual report for 1937 gives considerable attention to the New Education Fellowship Conference which was sponsored and organized by the Council. Other topics concern such matters as the future support of the Council, Carnegie Corporation visitors' grants, the Council's Committee on Secondary Education, and developments in Australian library services. The results obtained by applying intelligence tests to 30,000 children in all states have now been analyzed and the

report on this investigation is well on the way to completion.

A marked increase in the sale of the tests which have been standardized and published by the Council has taken place. During the year almost 12,000 tests or sets of tests were ordered. Some of these tests are used by teachers in connection with their professional studies, but the use of standardized tests for ordinary classroom purposes is obviously increasing rapidly in Australia.

The Council continues to function as a center for the provision of educational information. Of special interest was an inquiry from Canada concerning the origin and operations of the Council because of a proposal to establish a similar organization in that country.

During the year the Council published eight reports, bringing the total number of its reports to fifty. Of the year's reports the most important is the book on *Rural Education in Australia* published under the editorship of P. R. Cole.

Carnegie Study in Pennsylvania.—Bulletin No. 29 of the Carnegie Foundation for the Advancement of Teaching, by W. S. Learned and Ben D. Wood, entitled *The Student and His Knowledge*, is a partial report of a project undertaken ten years ago for the State of Pennsylvania and involving the examination of 26,000 high-school seniors and the testing of students in nearly fifty Pennsylvania colleges.

The chief interest of the report centers on the results of an identical eight-hour examination in the main aspects of a general education. This was given to high-school seniors, college sophomores, and college seniors. Some colleges examined all their classes. It turned out that nearly a quarter of the high-school seniors surpassed the average college sophomore, and more than a quarter of the college seniors scored below the average college sophomore. The report concludes that "obviously there is no sophomore standard any more than there is a senior standard or a high-school standard."

Of especial interest are the test results for high-school seniors who went to college as compared with those who went to work. The colleges took about 4,000 altogether, but 1,000 of these scored below the average of all who did not go to college, while at the same time there were 3,000 not going to college who were above the average of the 4,000 who did go. The report urges that this condition be corrected.

Senior-college students intending to teach averaged below the general average and below the average of nearly every other vocational class. Many of them had lower scores than high-school seniors four years below them. The report proposes that systematic tests be applied to make sure that teachers have as good an education as that already possessed by the pupils they expect to teach.

The identical tests, given twice, proved particularly effective in measuring the progress of college students from the sophomore to the senior year. Just as amount of knowledge was extremely variable, so progress over two years varied widely from student to student. About 15 percent of the 2,800 students examined twice had lower scores in the senior year than they had earned as sophomores. Students intending to be artists, musicians, or dramatists gained most, while those expecting to teach physical education gained least.

The essential features of education for which the college is responsible, the report says, are four:

1. Understanding of the student: "The institution that tries to help him must know just where the student's intellectual horizon is. It must then make certain

that the proposed extension of that horizon is within the student's reach and, quite as important, it must be satisfied that he understands and really wants to achieve it."

2. A concrete student goal in the form of "a plainly defined and substantial body of knowledge." "The only aim that counts in self-education is the aim that actually prevails in the student's mind . . . and results in action."

3. Provision for: (a) access to skilful teaching as the student, under expert personal direction, finds it needed, and (b) material facilities such as libraries, laboratories, and collections organized and administered primarily for the student's convenience in learning.

4. Provision for: (a) the recognition of cumulative progress in knowledge, measured comparably and comprehensively, and (b) the analysis and description of abilities, special traits, and peculiarities in the use of knowledge, as well as of conspicuous qualities of character and disposition.

The bulletin concludes with proposals for reorganizing educational procedure. The present "pseudo-standards" of time and credit should be abandoned. "The paramount standard is one which the institution holds unfailingly not before the student but before itself: it is none other than the standard of *suitability* which marks the treatment accorded to a student by the institution in view of his ascertained character and peculiar needs."

"The real question that now confronts the teacher is totally different, and in many cases, totally new: Is he capable of defining and dealing with the essentials of education other than knowledge? Originality, insight, and forceful thinking are elements that must be recognized and developed in the student's use of knowledge; a humane and generous understanding must be cultivated; as he learns, the student must be inspired with a tolerance for the same intelligent criticism that he is learning to apply and with an idealism grounded in reality. These and similar purposes are the real reasons for the existence of a teacher, not the 'imparting of information' as hitherto understood."

Institute for Social Progress.—"What part can a citizen of the United States play in the world situation?" is the crucial question which will bring men and women from many states to the Summer Institute for Social Progress at Wellesley College, Mass., July 9th to 23rd. Superintendents, principals, and teachers will be particularly welcome. Business executives, teachers, labor union leaders, industrial workers, ministers, and other professional workers will exchange opinions in informal round tables following lectures by experts on national and international economic and political issues, including democracy and peace. Several foreign embassies will be represented. Those interested in attending may obtain the complete program of work and recreation from Miss Grace L. Osgood, 14 W. Elm Avenue, Wollaston, Mass.

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